EDP industry report and market review

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• THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" ANNUAL INDEX • VOLUME 6 P.J. McGOVERN, EDITOR

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This index has been expanded and cross indexed to give our readers a more detailed guide to recent issues of **EDP Industry Report.** The dates of previous **EDP/IR** volumes are as follows:

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Volume 2 – March 15, 1966 to June 15, 1967
Volume 3 – June 28, 1967 to July 24, 1968
Volume 4 – July 31, 1968 to Aug. 29, 1969
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E|D|P industry report

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"THE GRAY SHEET" DECEMBER 15, 1970 • VOL.6,NO.1 P.J. McGOVERN, EDITOR

Concern or cautious optimism?

1970 TO CLOSE WITH DOMESTIC SHIPMENTS DOWN BUT TOTAL REVENUE UP 17%; LAGGING ECONOMY BRINGS SHAKEOUTS AND WORRY BUT OUTLOOK STILL HEALTHY

As yearend approaches reality, almost everyone even remotely connected with the computer industry is trying to assess what kind of a computeryear has opened the decade of the 1970s.

This itchy feeling, in the air for the last month or so among participants in the computer industry, was clearly verbalized at the Fall Joint Computer Conference in Houston a few weeks ago. Most of the exhibitors had optimistic but tenuous comments; "Whadayathink?" was the expression first out of most lips as people looked for signs of positive acceptance. And even though the crowd was composed more of industry insiders than usual, most visitors to Fall Joint were convinced that the worst was over.

Now, with the Holiday season approaching, the "What happened this year?" numbers are being assembled by various oracles, and for some time to come they will be used or misused to support almost any point of view. Since this happens far too often even in more "normal" years, EDP Industry Report in this issue presents the initial yearend figures compiled by its publisher, the International Data Corporation. We hope this will assist those people -- both within and outside the computer industry -- who are called on to evaluate the year that is ending and to look ahead into the 1970s.

In a macroscopic sense, 1970 had been a good -- if not a great -- year for the computer industry. For U.S.-based participants, projected revenues of $12.4 billion are up 17% over 1969; this growth rate is on the low side of a very positive 17% to 20% rate that most industry observers expect for the next five years; it is certainly the sort of growth that no other major industry can claim, recession or not.

With such a positive prognosis, one wonders why anyone could have doubts about the computer industry, but doubts indeed have been voiced by many members of the Wall Street community if nowhere else. These doubts -- and general confusion about the industry -- begin when we break the industry total down into its various component parts -- industry subsegments and, in several cases, their U.S. and international elements. And an even more distorted picture appears when we examine the individual companies within each of the subsegments. The casual observer could examine many discrete industry inputs and come up with a completely distorted picture. The following examples, which serve as an overview of what has happened during 1970, illustrate the types of problems that face the computer industry analyst:

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- Mainframe shipments in the U.S. will be 8% to 10% lower this year than they were in 1969. But, on average, international shipments account for about 40% of the business of U.S.-based mainframe manufacturers, and international activity is good (EDP/IR July 27, 1970). Thus, the domestic drop is more than offset by a 25% increase in international activity, and total shipments will be 4% higher than in 1969.

- Although shipments were down in the U.S., retirements of older equipment were also down. As a result, the installed base in the U.S. grew from $21.9 billion to $25.4 billion, up 16%. Therefore, the installed base -- an accurate indication of future revenues to manufactures -- will be some $1 billion larger at the end of 1970 than was anticipated just a year ago (EDP/IR March 12, 1970).

- Some industry subsegments, after posting growth rates of 65% to 100% during the last few years, will show only a 20% to 25% growth for 1970. Part of this is due to the economic slowdown, to be sure; but much of the change is strictly a sign that these businesses are moving out of their startup cycle and into a period of rapid but more balanced growth.

- Bankruptcies and mergers have occurred, and have been played up somewhat out of proportion as proof that the computer industry is in trouble. But many of these involved companies that were poorly organized to begin with and/or were late starters within industry sectors where growth no longer overpours the graph paper. Finally, many of these "casualties" have happened to companies that would never have been started in most industries, and their departure leaves a much more healthy situation for the surviving participants.

  During the "boom" years between 1967 and 1969, nearly 1,000 new EDP-oriented companies were formed. Over $1 billion was invested in them. In any other industry . . . at any other time . . . this would not have happened. But at the time in question, about all a new company had to do was to include the word "software" or "computer" or "cybernetics" in its name to float "a viable stock issue"; investors then grabbed it up with virtually no other investigation.

In summary, the numbers as a whole look almost as good as they did at this time last year; some look even better. But with the general economic malaise -- plus the apathy on Wall Street and several highly publicized problems -- many industry participants have reinterpreted the numbers. This is understandable, since earnings reports for the second and third quarters have been disappointing. But reports now indicate that the fourth quarter will show an uptick. IDC's outlook is that computer equipment manufacturers will experience a 15% to 17% revenue growth in 1971 and that firms offering computer software and services will see revenues increase about 25% next year.

Mainframe shipments up for the first time since 1968

It's the mainframe segment of the computer industry that probably has caused the most confusion among industry observers. In the U.S., shipments are off for the first time in the 15-year history of the computer industry. There are several reasons for this, and they will be detailed below. When examining the mainframe situation in the U.S., however, it is extremely important to keep the worldwide nature of the computer business in mind: Total newly built equipment shipments by U.S.-based manufacturers in 1979 will be about $7.3 billion.

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The U.S. component of this, however, will be only $4.4 billion, down from almost $4.8 billion in 1969. This is the value of new-built computer systems -- both general purpose and dedicated application -- shipped to customers in the U.S. It includes "add-ons" to existing systems as well as completely new installations, but does not take retirements into account. (Retirements for 1970 are estimated to be about $900 million). Here's IDC's preliminary estimate of shipments by company:

PRELIMINARY ESTIMATE OF 1970 WORLDWIDE COMPUTER SHIPMENTS
(Values in $ million for U.S.-based manufacturers)

Company	Shipments	% of Total
IBM	$ 4775	65.4%
HIS (Honeywell & GE)	650	8.9
Burroughs	470	6.4
Univac	390	5.3
NCR	310	4.3
RCA	$ 240	3.3%
Control Data	220	3.0
Digital Equipment	100	1.4
Xerox Data Systems	60	0.8
Others	90	1.2
TOTAL	$ 7305	100.0%

With shipments at the levels shown above, 1970 will be the best year yet for mainframe manufacturers. The value of installed computer hardware made by U.S.-based manufacturers will climb to $36.5 billion. For individual manufacturers, the 1970 results are mixed: NCR, Burroughs, and Digital Equipment have increases far larger than the industry average; Xerox is significantly down from last year, and Control Data and Univac also show reduced shipment levels.

Good year for minicomputers and peripherals; little for leasing

A substantial portion of Digital's growth during 1970 came from sales of minicomputers, included in what EDP/IR terms Dedicated Application Computers. Shipments of these mini- and control computers will add up to $570 million for 1970, IDC estimates. That's a 30% to 35% increase over 1969, but once again much of the activity comes from abroad. Shipments outside the U.S. are expected to be up 40% to 45% as compared to a 15% to 20% growth in domestic shipments. Looking ahead to 1971, IDC forecasts strong growth for Dedicated Application Computers because of expanded applications in the communications and industrial control areas.

Another industry segment which has good growth outlooks for 1971 -- as well as being the really prosperous section this year -- is independent peripheral manufacturing. During the budget pinch of 1970, this group of companies saved money for users, typically renting tape and disk drives, or terminals, for 15% to 20% less than the rate established by IBM. Shipments during 1970 were up an estimated 30% to about $570 million, and prospects for 1971 are for another 25% to 30% growth.

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The remaining factor in the hardware side of the computer industry -- third party leasing companies -- continued on their downward path insofar as purchases of new equipment are concerned. After spending some $1 billion for new computer equipment in 1968, the leasing companies dropped their purchase level to $500 million in 1969 and slashed it to about $150 million this year. Most of these purchases were for add-on equipment to keep up with needs of current customers. Looking ahead to the 1971-to-1973 period, the third-party leasing companies see renewals of short-term leases as their main concern. Secondly, they wonder what impact the IBM/370 computers will have on the market value of the $2 billion or so IBM/360s they currently own.

Software badly hit, services have mixed growth during 1970

It's all in how you read the numbers.

Software sales grew 20% during 1970, with estimated sales of $535 million for the year. This growth rate is better than that for the entire industry, and at first glance looks good. But, it is down from a 65% growth during 1969, and most of the people concerned read ominous implications into this performance. Prospects had been pegged as good, but the economic slowdown really hit home.

Following IBM's announcement of unbundling for the 1970s and beyond, many executives of software firms had predicted huge gains in sales for this year. The economic slowdown derailed this promise, however, and many users opted to defer expenditures for outside assistance . . . both for proprietary software packages and for contract programming. Looking ahead to 1971, IDC sees a brighter picture, with a 25% to 30% increase in sales of software.

Closely related to software is the computer service bureau business. In total, the service business is up 17% -- paralleling the industry -- to somewhat over $1 billion in sales for 1970. But there is a major split in the rate of growth of the various industries included within the services category.

Batch service sales were retarded by the economic slowdown and grew only 10% during 1970, from $750 million to $825 million. The two smaller segments of the service business, however, fared somewhat better: Remote batch business will be showing a 50% increase from $60 million to $90 million; and Rair (remote access/immediate response) services will grow by 40% to $165 million. And this growth is expected to continue. By 1974, IDC predicts that the Rair business will be in the $600 million neighborhood.

The old steady and the comer

Many computer industry observers completely forget the supplies sector. Or they consider only magnetic tape and disk packs. But the bulk of the supplies business is in paper -- both for printouts and in the form of punched cards. This constitutes over 75% of the total supplies market, which this year should register final sales of $1,185 million, up a consistent 10% over 1969. Growth tends to be in this range -- another 9% is expected for 1971 -- but is quite steady. As users gradually move to on-line systems and substitute some CRT displays for hard copy, the growth of paper supplies may gradually decline; but so long as IBM is committed to the punched card and the line printer, the business will continue to grow.

The final segment of the computer industry -- education -- may have the most exciting growth potential of all. When IBM unbundled, it set the stage for much more dramatic growth in education; the biggest educator of all was now charging.

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Users curtailed their spending on education to some extent during 1970, and as a result this sector grew only 25%! There are still a lot of "production line" schools, and many have given education a bad name. These "schools" crank out over 100,000 "programmer" graduates a year, even though the demand is for only 10% of this amount. But there are some respectable names going into or continuing in the education business. Control Data had an early start in this area with its Institute, and Honeywell has followed suit . . . training students for competitive equipment as well as its own. And IBM, though not doing as much business as had been expected, still teaches quite a few people. The education business should be up another 30% or so in the U.S. during 1971.

Domestic restraints, and outlook

There was definitely a finite drop in U.S. hardware shipments during 1970. This is the result of several factors, some of which are based on the economy. The primary reason for this drop -- accentuated as it has been by economic pressure -- is the cyclical nature of the computer industry. The current squeeze caught the industry at its most vulnerable point . . . just as it was preparing for the next round of new product introductions and massive shipments. Here's a summary of the major factors involved:

- Despite the extensive round of new product announcements during the summer and fall of 1970, most of the equipment being shipped today is in its fifth or sixth year of manufacture. Thus, many users would have been in a "waiting" position today even if they had unlimited budgets. But they have postponed add-on equipment because of limited budgets, and ordered from $3 billion-plus worth of IBM/370s and other new equipment, so backlogs are probably the highest ever as we enter 1971

- Many users, also, have seen reduced sales volumes (or at least limited growth) during 1970 and, more importantly, lower profits. They have naturally decided to delay additions or upgrades, and have deferred additional related expenses in personnel, outside software, use of service bureaus, time sharing, and education.

- And in the light of "zero" budget increases for 1970, many users who had to increase their processing power have taken the route of the plug-to-plug compatible peripheral . . . sending back equipment supplied by the mainframe manufacturer and replacing it -- at discounts upward of 15% -- with independent units. This situation, though good for the independent peripheral manufacturer, has impacted the mainframer's business.

But things look up as the new year approaches. New products announced during 1970 will start being delivered, and the Government has apparently decided to stimulate the economy. Companies with more than 5000 employees will probably be the first to feel these stimulative effects of Uncle Sam's expansive fiscal and monetary policy; and recent IDC studies indicate that these organizations do plan sizable increases in EDP budgets for 1971. Smaller firms will show more of a delayed reaction, but should begin sharp increases in EDP expenditures by mid-1971. Overall, IDC expects computer equipment manufacturers to have a 15% to 17% revenue growth next year, with firms offering computer software and services experiencing a 23% to 25% growth.

And these are domestic figures. No dramatic slowdown is expected in the international marketplace, so 1971 looks to be a very good computeryear.

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GENERAL PURPOSE COMPUTER CENSUS

Counts in the General Purpose Digital Computer (Group A) Census, shown below, are based on the best information available to the International Data Corporation, but are estimates. Computer manufacturers, as a rule, do not directly supply this type of information, and it is only through the use of IDC's extensive data files and other information sources that such estimates are possible. The computers included in "Group A" comprise the bulk of digital computers in operation. They are byte or character oriented -- with the exception of large-scale scientific machines -- and are primarily programmed with higher-level languages. In addition to this Census, EDP/IR publishes a Dedicated Application Digital Computer (Group B) Census that includes minicomputers and specialized-purpose machines.

AS OF OCTOBER 1, 1970

NAME OF MANUFACTURERS	COMPUTER MODEL	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS IN U.S.	NUMBER OF INSTALLATIONS OUTSIDE U.S.	TOTAL NUMBER OF INSTALLATIONS	TOTAL NUMBER UNFILLED ORDERS
Burroughs	205	$ 4,600	1/54	3	13	16	X
	220	$ 14,000	10/58	12	2	14	X
	B-100 Series	$ 3,300	8/64	55	6	61	X
	B-200 Series	$ 6,500	11/61	293	133	426	X
	B-300 Series	$ 8,000	7/65	553	87	640	X
	B-500	$ 3,800	11/68	243	232	475	80
	B-2500	$ 6,200	2/67	165	65	230	35
	B-3500	$ 14,000	5/67	263	117	380	75
	B-4500	$ 29,000	11/71	-	-	-	25
	B-5500	$ 33,500	3/63	131	38	169	X
	B-5700	$ 27,000	12/70	-	-	-	N/A
	B-6500	$ 70,000	6/69	16	8	24	36
	B-6700	$ 67,000	2/71	-	-	-	
	B-7700	$120,000	2/72	-	-	-	N/A
	B-8500	$200,000	4/69	2	0	2	X
	Subtotals			1736	701	2437	251
Computer Operations, Inc.	Gemini	$225,000	6/71	-	-	-	1
Control Data Corp.	G-20	$ 19,600	4/61	13	9	22	X
	1604/A/B	$ 42,000	1/60	33	9	42	X
	31/3150	$ 10,500	12/64	101	52	153	7
	3170	$ 16,700	12/70	-	-	-	5
	3200	$ 14,000	5/64	60	37	97	X
	3300	$ 20,500	9/65	127	93	220	20
	3400	$ 23,700	11/64	9	10	19	X
	3500	$ 25,000	1/69	9	9	18	2
	3600	$ 48,000	6/63	28	16	44	X
	3800	$ 53,000	12/65	17	4	21	X
	6200	$ 39,000	11/70	-	-	-	5
	6400	$ 55,300	5/66	65	18	83	6
	6500	$ 65,500	12/67	15	2	17	3
	6600	$127,000	8/64	66	21	87	6
	6700	$137,000	7/70	2	0	2	2
	7600	$190,000	1/69	4	0	4	4
	Subtotals			549	280	829	60
Digital Equipment Corp.	PDP-6	$ 10,000	10/64	18	3	21	X
	PDP-10	$ 13,500	10/67	128	31	159	12
	Subtotals			146	34	180	12
Friden	System-10	$ 1,400	10/70	-	-	-	40
Honeywell Information Systems	GE-53	$ 960	3/69	-	58	58	50
	GE-55	$ 990	1/66	70	1170	1240	100
	GE-58	$ 980	5/70	25	145	170	60
	GE-105	$ 1,350	3/69	45	165	210	60
	GE-115	$ 2,500	4/66	510	1060	1570	70
	GE-120	$ 3,200	1/70	13	40	53	45
	GE-130	$ 4,400	10/69	5	80	85	20
	GE-205	$ 2,900	6/64	7	0	7	X
	GE-210	$ 16,000	3/60	30	0	30	X
	GE-215	$ 6,000	9/63	8	2	10	X
	GE-225/255	$ 8,000-$17,000	4/61-10/67	160	23	183	X
	GE-235/265	$12,000-$19,500	4/64-10/65	95	16	111	X
	GE-245/275	$13,000-$23,000	10/69	11	3	14	6
	GE-405/410	$ 6,800-$10,500	2/68-11/69	35	7	42	6
	GE-415/420	$ 7,300-$18,000	5/64- 6/67	252	176	428	X
	GE-425/430	$ 9,600-$16,700	6/64- 6/69	77	54	131	X
	GE-435/440	$13,700-$23,800	9/65- 7/69	35	9	44	4
	GE-615	$ 30,000	6/69	15	3	18	8
	GE-625	$ 36,000	4/65	2	7	9	X
	GE-635	$ 45,000	5/65	71	9	80	3
	GE-645	$ 90,000	7/66	4	0	4	X
	GE-655	$ 80,000	1/71	-	-	-	8
	H-110	$ 2,600	9/68	199	62	261	35
	H-115	$ 3,700	6/70	20	4	24	325
	H-120	$ 4,800	1/66	775	270	1045	X
	H-125	$ 7,100	12/67	152	200	352	45
	H-200	$ 7,500	3/64	735	295	1030	X
	H-1200	$ 9,800	2/66	162	82	244	X
	H-1250	$ 12,000	8/68	207	36	243	42
	H-2200	$ 18,700	1/66	152	66	218	12
	H-3200	$ 22,000	2/70	16	6	22	22
	H-4200	$ 26,200	9/68	22	4	26	7
	H-8200	$ 50,000	2/69	11	5	16	4
	H-400	$ 10,600	12/61	50	36	86	X
	H-1400	$ 14,000	1/64	4	6	10	X
	H-800	$ 26,000	12/60	58	14	72	X
	H-1800	$ 46,000	1/64	14	3	17	X
	S-15	$ 1,800	7/70	6	1	7	14
	Subtotals			4053	4117	8170	946

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AS OF OCTOBER 1, 1970

NAME OF MANUFACTURERS	COMPUTER MODEL	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS IN U.S.	NUMBER INSTALLATIONS OUTSIDE U.S.	TOTAL NUMBER OF INSTALLATIONS	TOTAL NUMBER UNFILLED ORDERS
IBM	System-3/6	$ 1,015	12/70	-	-	-	N/A
	System-3/10	$ 1,400	1/70	850	150	1000	7300
	360/20	$ 3,200	12/65	8050	3920	11,970	1100
	360/25	$ 7,500	10/68	1780	570	2350	600
	360/30	$ 10,500	6/65	7650	3350	11,000	150
	360/40	$ 19,300	5/65	3400	1600	5000	220
	370/145	$ 22,500	8/71	-	-	-	N/A
	360/44	$ 12,000	7/66	159	72	231	9
	360/50	$ 33,000	8/65	1390	580	1970	135
	370/155	$ 48,000	2/71	-	-	-	200
	360/65	$ 63,000	11/65	638	196	834	100
	370/165	$ 90,000	4/71	-	-	-	60
	360/67	$138,000	6/66	48	8	56	6
	360/75	$ 81,400	1/66	58	21	79	5
	360/85	$155,000	10/69	8	3	11	7
	360/9X	$150,000	11/67	16	6	22	X
	360/195	$232,000	3/71	-	-	-	13
	1130	$ 1,700	2/66	3770	1360	5130	80
	305	$ 3,600	12/57	3	10	13	X
	650	$ 4,800	12/54	21	14	35	X
	1401	$ 6,200	9/60	1900	1630	3530	X
	1401-G	$ 2,300	5/64	363	98	461	X
	1401-H	$ 1,300	6/67	147	39	186	X
	1410	$ 17,000	11/61	196	103	299	X
	1440	$ 4,100	4/63	1005	715	1720	X
	1460	$ 9,800	10/63	153	66	219	X
	1620	$ 4,000	9/60	635	355	990	X
	7010	$ 26,000	10/63	42	12	54	X
	7030	$160,000	5/61	6	2	8	X
	704	$ 32,000	12/55	8	2	10	X
	7040	$ 25,000	6/63	35	36	71	X
	7044	$ 36,500	6/63	26	21	47	X
	705	$ 38,000	1/56	19	9	28	X
	7070/74	$ 27,000	3/60-2/61	189	62	251	X
	7080	$ 60,000	8/61	75	2	77	X
	7090	$ 63,500	6/60	30	23	53	X
	7094	$ 73,400	9/62	86	9	95	X
	7094-II	$ 79,400	4/64	21	1	22	X
	Subtotals			33,640	15,333	48,973	10,035
NCR	Century-100	$ 2,600	9/68	990	240	1230	555
	Century-200	$ 7,700	6/69	350	85	435	400
	Century-300	$ 26,000	2/72	-	-	-	N/A
	304	$ 14,000	1/60	18	3	21	X
	310	$ 2,500	5/61	17	4	21	X
	315	$ 9,000	5/62	446	382	828	X
	315-RMC	$ 12,500	9/65	98	33	131	X
	390	$ 1,000	5/61	339	402	741	X
	500	$ 1,200	10/65	1510	980	2490	X
	Subtotals			3768	2129	5897	955
Philco	1000	$ 7,000	6/63	13	1	14	X
	210/211	$ 40,000	10/58	12	1	13	X
	212	$ 52,000	1/63	12	1	13	X
	Subtotals			37	3	40	X
RCA	2	$ 15,400	8/71	-	-	-	29
	3	$ 18,900	8/71	-	-	-	23
	6	$ 29,300	8/71	-	-	-	15
	7	$ 36,000	8/71	-	-	-	12
	Spectra 70/15	$ 4,500	9/65	69	126	195	20
	Spectra 70/25	$ 7,200	9/65	25	55	80	9
	Spectra 70/35	$ 11,000	1/67	210	215	425	55
	Spectra 70/45	$ 21,000	11/65	365	170	535	65
	Spectra 70/46	$ 36,000	11/68	50	2	52	17
	Spectra 70/55	$ 35,000	11/66	31	14	45	9
	Spectra 70/60	$ 38,000	9/70	1	-	1	8
	Spectra 70/61	$ 50,000	2/71	-	-	-	5
	301	$ 7,500	2/61	309	211	520	X
	3301	$ 19,000	7/64	78	8	86	X
	501	$ 14,000	6/59	52	2	54	X
	601	$ 35,000	11/62	5	0	5	X
	Subtotals			1195	803	1998	267
Standard Computer Corp.	IC-4000	$ 9,000	9/68	15	-	15	1
	IC-6000	$ 16,000	5/67	9	-	9	X
	IC-7000	$ 17,000	6/69	15	-	15	4
	Subtotals			39	-	39	5
Univac	I/II	$ 25,000	3/51-11/57	17	3	20	X
	III	$ 25,400	8/62	52	36	88	X
	File Computers	$ 15,000	8/56	2	0	2	X
	SS-80/90	$ 8,000	8/58	93	59	152	X
	418-I/II	$ 13,700	6/63-9/64	129	88	217	18
	418-III	$ 19,600	7/69	19	10	29	51
	491/492	$ 27,000	12/61	43	24	67	X
	494	$ 41,400	2/66	64	29	93	11
	1004	$ 1,900	2/63	1300	1250	2550	X
	1005	$ 2,550	4/66	700	190	890	X
	1050	$ 8,800	9/63	245	159	404	X
	1103/1105	$ 35,000	12/50-9/58	6	2	8	X
	1106	$ 40,000	12/69	14	5	19	37
	1107	$ 57,000	10/62	22	19	41	X
	1108	$ 68,000	9/65	135	86	221	41
	9200	$ 1,700	6/67	1110	515	1625	420
	9300	$ 4,000	9/67	665	635	1300	315
	9400	$ 10,000	5/69	38	66	104	135
	LARC	$135,000	5/60	1	0	1	1
	Subtotals			4655	3176	7831	1029
Xerox Data Systems	Sigma-5	$ 7,700	8/67	146	36	182	20
	Sigma-6	$ 14,100	11/70	-	-	-	10
	Sigma-7	$ 16,600	12/66	92	25	117	12
	940	$ 25,000	4/66	69	9	78	X
	9300	$ 8,500	11/64	33	8	41	X
	Subtotals			340	78	418	42
	Totals			50,158	26,654	76,812	13,645

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November 23, - December 4, 1970

	1970 High	1970 Low	2 Week Sales in 100's	2 Week High	2 Week Low	Last	2 Week Net Change	2 Week % Change
NEW YORK STOCK EXCHANGE								
Addressograph-Multigraph	62	19 1/2	2744	24 3/4	19 1/2	23 3/4	+ 1 1/8	+ 5
American R & D	99 1/2	37 1/8	2705	56 3/8	47 7/8	54 1/4	+ 6 5/8	+ 14
Ampex Corp.	48 1/2	12 1/2	2091	18 3/8	17 1/8	18 1/8	+ 2 7/8	+ 19
Automatic D P	49 1/2	23 1/2	1298	49 1/2	42	47	+ 4	+ 9
Bunker Ramo	14 1/2	6 1/8	1106	9 1/4	8 5/8	8 7/8	+ 1/8	+ 1
Burroughs	172 3/4	78 5/8	4784	117 3/4	102 5/8	115	+ 12 1/8	+ 12
Collins Radio	37 1/4	9	627	15 3/8	12	15 1/8	+ 3	+ 25
Computer Sciences	34 1/8	5 3/8	2234	11 7/8	9 1/2	11	+ 1	+ 10
Control Data	122 1/2	28 3/4	3705	53	46 3/4	50 7/8	+ 3 5/8	+ 8
Data Proc. Fin. & Gen.	32	6 5/8	2326	12 3/4	9 7/8	12	+ 2 1/8	+ 22
Digital Equipment	124	48 3/4	1779	95 7/8	56 1/8	67 1/2	+ 11 1/2	+ 21
Electronic Assoc.	11 5/8	3 5/8	499	4 3/4	4 1/8	4 1/4	+ 1/8	+ 3
General Electric	89	60 1/4	3787	88 7/8	86	87 1/2	+ 1 1/4	+ 1
Honeywell	152	65 5/8	3950	82	71	81 5/8	+ 9 3/4	+ 14
IBM	387	218 3/4	4184	315	295 1/4	311 3/4	+ 15 1/4	+ 5
ITT	60 1/8	30 1/2	7198	48 1/4	42 7/8	48	+ 4 1/2	+ 10
Leasco	30 1/2	7	3869	13 3/4	10	13 1/8	+ 2 3/4	+ 27
Litton	38	15 1/4	5993	22 3/8	19 3/8	21	+ 1 3/8	+ 7
Memorex	166 3/4	44 1/2	6060	85	64 7/8	82 7/8	+ 10 1/8	+ 14
Mohawk Data Sciences	87	18 1/8	2727	29 5/8	25	27 1/2	+ 1 7/8	+ 7
National Cash Register	63	29 1/4	4199	37 5/8	33	35 7/8	+ 2 3/8	+ 7
Planning Research	53 1/4	13 5/8	1144	19 1/2	16 7/8	18 1/4	+ 3/8	+ 2
RCA	34 5/8	18 1/8	5420	26 1/8	22	25 3/4	+ 3	+ 13
Raytheon	33 5/8	16 1/8	1654	24 7/8	20	24 1/8	+ 3 3/4	+ 18
SCM	24 3/4	11 1/8	1290	14	11 3/4	13 3/8	+ 1 3/8	+ 11
Sanders	29 7/8	7 1/8	712	13 7/8	10 1/2	12 3/8	+ 2	+ 19
Sangamo	29 1/8	9 1/8	468	15 3/8	13	15	+ 2	+ 15
Singer	85 3/4	53 1/4	3023	61 3/4	57	61 1/2	+ 1/2	+ 1
Sperry Rand	40 3/8	18 3/4	4682	25 1/4	22	24 7/8	+ 2 1/2	+ 11
Teledyne	40	13	6087	22 1/2	18 1/8	21 3/8	+ 3 1/4	+ 18
Telex	25 7/8	9 1/8	10,850	22	17 7/8	20 7/8	+ 1 7/8	+ 10
University Computing	99 3/8	13 1/4	3945	24 3/8	19 1/2	22 3/4	+ 2 7/8	+ 14
Western Union	48 1/4	31	2161	40	35 1/8	38 3/4	+ 3 1/4	+ 9
Xerox	115 3/4	65 1/4	5212	89 5/8	84 3/4	89 1/4	+ 4 1/2	+ 5
NYSE COMPUTER STOCK AVERAGE							+ 3.8	+11.4
AMERICAN STOCK EXCHANGE								
Applied Data Research	24 1/4	3 3/4	232	5 5/8	4 3/8	5 1/8	- 1/4	- 5
Bolt, Beranek & Newman, Inc.	8 3/4	5 5/8	46	6 5/8	5 5/8	6 1/4	--	--
Calcomp	35 7/8	10 1/4	3338	35 7/8	28 3/4	34 1/4	+ 4 1/4	+ 14
Clary Corp.	10 1/2	3 3/8	137	4 7/8	4 1/4	4 5/8	+ 1/8	+ 3
Computing and Software	75 3/4	16 1/4	726	33 1/4	29 1/2	32 1/4	+ 2 5/8	+ 9
DPA, Inc.	10 3/8	3 3/8	296	4 1/2	3 3/4	3 7/8	--	--
Data Products	25 1/2	4 3/4	869	7 3/8	3 3/4	6 3/8	- 1/8	- 2
Granite Mgt.	22 1/4	7 3/8	212	10 3/4	9	9 7/8	+ 5/8	+ 7
Greyhound Computer	14 1/8	5	92	7 1/2	6 1/4	6 3/4	+ 3/8	+ 6
ITEL	25 1/2	6 1/8	1403	17 3/4	15 3/4	17 1/8	+ 7/8	+ 5
Levin-Townsend Comp.	19 3/8	3	534	6	4 3/4	5 5/8	+ 3/4	+ 15
Milgo Elect.	40 1/2	15	3293	33 5/8	27 5/8	30 3/8	- 3/8	- 12
Potter Instrument	42 3/4	14 5/8	517	20 7/8	17 1/2	19 3/4	+ 2	+ 11
Sys. Eng. Labs.	49 1/8	10 1/8	2141	17 7/8	13 5/8	16 1/2	+ 2 3/8	+ 17
AMSE COMPUTER STOCK AVERAGE							+ 0.9	+4.9

OVER-THE-COUNTER	1970 High Bid	1970 Low Bid	November 23, Bid	November 23, Asked	2 weeks ago Bid	2 week net change Bid	2 week % change Bid
Aries Corp.	8	1 1/4	1 5/8	2	2	- 3/8	- 19
Computer Usage	8 1/2	2	4 1/2	4 7/8	4	+ 1/2	+ 13
DASA Corp.	44	3 1/2	5 1/8	5 3/8	3 1/2	+ 1 5/8	+ 46
Digitronics	13 3/4	3 5/8	3 5/8	4 1/8	3 5/8	--	--
Fabri-Tek	8 1/2	2	2 7/8	3 1/4	2	+ 7/8	+ 44
Informatics, Inc.	20 1/2	4 1/4	5 1/4	5 3/8	6 1/8	- 7/8	- 14
LMC Data, Inc.	3 5/8	1	--	--	--	--	--
Management Assistance	4	1	--	--	1	--	--
Optical Scanning Corp.	52	11	15	16 1/2	15	--	--
Recognition Equipment Inc.	83 1/2	12 3/8	14 1/2	15	13	+ 1 1/2	+ 12
TBS Computer Centers Corp.	27	4	4 1/2	5 1/2	4 1/4	+ 1/4	+ 6
Tally Corp.	23	9 1/2	12 3/4	13 3/4	12	- 3/4	+ 6

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E|D|P industry report

• THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" DECEMBER 21,1970 o VOL.6,NO.2 P.J.McGOVERN, EDITOR

Lower margins for memory equipment

THE INDEPENDENTS CAPTURE SHARE OF THE PROFITABLE MEMORY MARKET, BUT IBM COUNTERS WITH NEW PRICES AND PRODUCTS

IBM dropped its first shoe in the tape and disk drive field when it announced the 3330 large capacity disk system. But then, the shoes kept coming until IBM seemed to have as many feet as a centipede. The 2319 no-controller disk for the 370/145. The 3420 tape system. The suit against Memorex. And now, IBM has let go another one: a 2319 which will be available for the System/360 beginning in April, 1971.

The 2319 disk is the biggest immediate threat of all to the independents' market opportunity. This relatively low-priced version of IBM's 2314 disk may cut into the largest and fastest growing part of the independent memory suppliers' business -- 2314 replacements. At least that's the danger unless the independents react quickly with their own price cuts. This issue analyzes the impact of IBM's latest moves and outlines the future for independents in a "new" market environment.

Year of growth

During 1970, the independent tape and disk drive suppliers have without a doubt enjoyed their best year ever. These manufacturers, marketing IBM compatible tape and disk systems directly to IBM users, dramatically improved their market share during 1970 -- the year of the budget crimp -- as many larger users turned to independent memory gear for rental savings.

Research recently completed by International Data Corporation, publisher of EDP/IR, indicates that by yearend 1970 independent memory suppliers will have captured about 11% of the 360 compatible tape drive market in the U.S., 13% of the domestic 2311 disk drive market, and 3% of the fast-growing 2314 market. In fact, the independents have more than doubled their installed base of tape and disk systems in the last year -- a startling accomplishment.

The memory sector of the EDP market is particularly important to mainframe suppliers as well as to independents, since it is well known to have boasted record profit margins over the past five years. Widely recognized as a prime growth market, and still supporting very high profit margins, the memory market has drawn the entry of a number of "independents" as well as increased attention from virtually all mainframe suppliers (EDP/IR August 17, 1970 and December 9, 1970).

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And rightly so . . . the "memory sector" of the EDP marketplace promises continued growth throughout the early 1970s and is vitally important to many EDP equipment suppliers. During 1969, for example, shipments of memory equipment to the end user totaled nearly 31% of worldwide EDP hardware shipments, or nearly $2.2 billion. With the stakes so important, no wonder that the competition is intensifying.

However, by entering a lucrative market dominated by IBM, independents have incurred two basic risks -- new equipment developments and repricing on the part of IBM. It is only during 1970 that a few independents have just begun to see the first real signs of success, and now -- before the year is out -- IBM has already made strong countermoves through both its product and its pricing policies.

New disk drive announcements stir up the marketplace

Earlier this fall IBM announced what is, in effect, a repriced version of its highly successful 2314 system -- called the 2319 -- for System/370 145 users. With the 2319 and the 3330 disk, IBM has provided for both larger (145, 155 and 165) and smaller (145 and probably the 135) disk requirements -- the 3330 for the former and the 2319 for the latter.

The 2319 consists of three drives. The version just announced allows 370/145 users to rent two 2319s and up to two additional drives for a total of eight. IBM built the controller for the 2319 system into the 145's central processor and termed it the Integrated File Adapter. Thus, it would appear that for Model 145 (and possibly the 135), independent suppliers will not be able to market 2314-type control units to 370 users, at present, unless the user plugs the system directly onto the channel -- a move that for the most part would not appear to be economical. If IBM follows this policy on the 135, the same consequences will follow.

An analysis of the new pricing for the 2319 systems is included in the table below along with prices for independent 2314-type systems. Note that IBM has really repriced the 2314 system for 370/145 users by knocking off about $1,500 per month on a rental basis for a full string 2319, comparable to the current 2314 drive.

2314 DISK SYSTEM PRICING

	IBM			Telex	Memorex	CalComp
	2314	2319(IFA)	2319	2314	2314	2314
Controller	$1,460	$ 550	$1,480	$1,305	$1,315	$1,130
Three drives and controller	2,930	1,550	2,480	2,610	2,605	2,270
Eight drives and controller	4,970	3,470	4,480*	4,785	4,755	3,690
Prime shift charges	4,970	3,470	4,480	4,785	4,755	4,245
Overtime charges	Yes	No	Controller Only	No	No	Yes

* Nine drives and controller

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Now, by making the 2319 available to the 360 user -- via a version of the 2314 controller -- IBM is in effect cutting prices on its 2314 disk system. And with first deliveries in April, this impacts current 360 installations as well as future 370s. Furthermore, users can hook three 2319-modules onto the controller, thus having on-line access to eight disk drives. The ninth, as on earlier 2314s, is a spare.

Market impact of the 2319

The price of a full nine-drive 2319, for a 360 computer, is $4480. For the independents, the monthly rental with only eight drives is in the $4245-$4785 range. The corresponding charge for IBM's old eight-spindle 2314 is $4970. IBM has also eliminated overtime charges on the 2319 -- taking away still another competitive advantage of some of the independents.

Thus, even though the new 2319 underprices the independent drives, the difference may not be big enough to actually oust currently installed independent disks. But any price advantage at all for IBM takes away users' primary reason for installing independent drives: Saving money.

IBM, however, impacts its own 360 rental base with this move. Users of large 360s see the obvious saving in hanging 2319s on their systems, replacing 2314s. Those who don't plan near-term upgrades to 370s will probably switch to 2319s at a 15% lower monthly rental. The strategy is a tradeoff on IBM's part: A near-term challenge to the independent 2314s while the 3330 waits in the wings.

The "Merlin" 3330

Independent disk drive suppliers are shouting anti-trust violations; users are trying to analyze upgrade alternatives; and many people are still just plain confused. But one thing is certain . . . IBM's new 3330 disk drive, unveiled with the System 370/155 and 165 in the summer of this year, is sure to have an important impact on the lucrative disk drive market during the early 1972-1973 period.

In fact the impact of the new 3330 disk drive could even spread to the general purpose mainframe market if early indications are any clue. Already, in an unprecedented move, a major mainframe supplier (RCA) has rushed to order 3330s directly from IBM on an OEM basis. RCA believes the new disk drive is important enough to offer with its newly announced "transition" generation systems.

For future System/370 users having large disk requirements, the 3330 represents a very attractive upgrade as compared with the present 2314 system. The 3330 will store up to 800 million bytes of data, over three times the capacity of the 2314, for only $7600 per month. What's more, access time is half the 2314's. Clearly the 3330 compares well in storage capacity and price/performance to the 2314 system; three eight-spindle 2314 systems rent for a total of about $13,500. To date, users are quite pleased with the announced specifications of the 3330; many say the 3330 is one of the most important parts of System/370.

Fine for future large System/370 users, but what about System/360 Models 50, 65 and 75? So far, IBM has said nothing about making the 3330 available to 360 customers, with this exception: Models 85 and 195 can use the 3330. Thus, most big 360 installations will have to continue with 2314s -- or 2319s -- supplied by either IBM or the independents.

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Market impact of the 3330

A study in parallels . . .

That's what IBM's announcement of the new 3330 disk drive seems to be. In the future, the 3330 would appear to have about the same impact on the 2314 disk drive market that the 2314 drive has had on the 2311. The 2311 disk market grew rapidly in the 1965-1968 period; during 1968 IBM began to make volume deliveries of the 2314 to users with large disk storage requirements which lessened demand for 2311's. Then in 1970 the demand for 2311 drives was further reduced when IBM "unbundled" the 2314 making it available with fewer than eight spindles.

More than likely the most important growth in the disk drive market will be in the new 3330 type drives during 1972-73. By that time the accelerating demand for 2314 systems will begin to slow dramatically, with the larger System/360 2314-type users opting for System/370 and the 3330.

Then too there is the distinct possibility that IBM will "unbundle" the 3330 (making it available in modules containing 100 million bytes of storage) and further impact the demand for 2314s, just as happened with the 2311 and the unbundling of the 2314 in 1970. Naturally the question arises -- what will be the impact of the 3330 on independent disk drive suppliers during the first half of the 1970s?

To remain competitive during the next five years, the larger independent disk drive suppliers will have to offer 3330 compatible equipment. While undoubtedly there will continue to be a market for 2314 drives over the next four years, beginning in 1972 there will be a marked shift in demand from the 2314 to the 3330 disk as users install 370 series computers. Suppliers offering only 2314 systems during 1972-1973 will not have the equipment to entice orders from larger users -- the group that to date represents the most important market for independent suppliers.

Prognosis

At present several independents -- Memorex, Telex and Century Data (CalComp) to name a few -- are finalizing plans to manufacture and deliver 3330 compatible systems directly to the end user. Thus, this new round of disk marketing -- unlike the last one -- is likely to find the independents delivering close behind the leader. They should be ready to ship 3330 substitutes shortly after IBM starts in the fall of 1971 to ship its largest and fastest disk system, rather than trailing first IBM deliveries by years as they did with the 2314 in 1968.

This, however, is only if Memorex (and possibly other independents) aren't inhibited from marketing a 3330-type drive by IBM's current suit against Memorex (EDP/IR Dec.9,1970). In its complaint, IBM asks specifically that Memorex be enjoined for 30 months from marketing any 3330-compatible unit which contains or is produced via IBM's trade secret information.

In the meantime, independents will concentrate on marketing 2311 and 2314-compatibles to System/360 users. If they adjust prices on their 2314 type drive units, independents should be able to keep on renting 2314 replacements to the current IBM base. And they may capture a share of the 2319 compatible (Models 145 and perhaps 135) drive market. The latter alternative doesn't look as juicy, however, in view of IBM's new pricing and inclusion of the controller as a feature of the central processor.

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IBM is definitely taking steps to avoid further erosion of its disk markets by independents. But there still appear to be broadening opportunities in the disk market remaining for a few larger independents . . . if they make the competitive moves which IBM has now forced upon them.

IBM's 3400 TAPE DRIVES -- A REPRICING MOVE

For the most part, IBM's announcement of the 3400 tape drive series, (available at midyear 1971) is not at all startling, and has not shocked most experts in the tape drive field. The newer systems really represent a pricing adjustment, rather than more advanced technology, and appear to offer an attractive upgrade for the largest base of current IBM tape drive users -- slow speed 60KB (or less) 2401 users that account for about 65% of IBM's total U.S. drive population in use at year-end 1970.

Much of the technology incorporated in the "new" drives is not really new at all and is already available on some equipment supplied by independents. Examples are automatic threading or higher throughput rates. Thus, more than anything, the 3420 announcement is an attempt by IBM to offer future IBM tape drive users vast improvements in price performance.

The question remains -- how will the new price changes impact both IBM and the independent suppliers of tape drives, like Potter, Telex, Ampex, Storage Technology and others? A look at the table below that includes approximate price ranges for IBM and independent equipment provides a clue.

TAPE DRIVE PRICING

MODEL NUMBER	Speed in KB	Controller	System Price (Controller & 4 Drives)
IBM 2420-7	320	$1,140	$5,220
Potter 2427		680	4,220
Telex 5420-7		800	4,380
IBM 3420-7		675	3,335
IBM 2420-5	160	$1,140	$3,400
Potter 2425		680	2,680
Telex 5420-5		350	2,840
IBM 3420-5		675	2,915
IBM 2401-5	90	$ 800	$2,940
Potter 2405		680	2,580
Telex 4852		350	2,246
IBM 3420-3		675	2,435
IBM 2401-4	60	$ 800	$2,340
IBM 2401-2		650	2,590
Potter 2402		550	2,290
Telex 4822		350	2,050

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In the past the higher speed tape drive units from IBM have been far too expensive for the vast majority of tape drive users. The IBM 2420-5 or 2420-7 drives represented a large increase in rental prices for most slow speed 2401 tape drive users. IBM 2420 drives rent for 50-100% more than the popular 2401 series systems. Thus the large majority of IBM users, about 75%, continued to utilize the slower speed 2401 systems supplied by either IBM or the independents.

Now, however, IBM users will find the newer and faster 3400 series tape drives a very attractive upgrade. Particularly the largest group of IBM tape drive users, or 75% of all tape drive users having 60KB or slower 2401 systems, can now upgrade to a system like the 3420-5 for a reasonable 20% increase in rental expenditures. And the minority of users with 2420-5 or -7 systems will get a better price break from IBM than in the past.

Lower, but apparently still "healthy" profit margins

Thus it would seem that more than anything else, IBM's new 3420 tape drive series represents a change in pricing strategy. And the pricing change would seem to be directed primarily at upgrading IBM's current base of slow speed 2401 users, as well as lowering the umbrella under which independents can market their systems at a discount and still make a profit.

Many inside observers insist that for years IBM has enjoyed substantially "above target" profit margins on tape (as well as disk) systems, and that the new pricing reflects keener competition from independents -- especially when viewed against the rapid strides made particularly by independents supplying IBM compatible tape systems during the past year.

Clearly the new pricing policies would appear to impact independents in two ways: they would place in jeopardy their already existing 2401 compatible installations at current price levels; and they would more than likely reduce profit margins on higher speed 2420-3420 type compatible equipment. Since the largest share of the 7,000 independently supplied drives are slower speed 2401 types, it would appear that these users -- just like IBM users -- would be likely candidates for upgrading to the 3400 type drives.

Thus independents will either have to reduce their prices on existing 2401 compatible units, or offer their users 3420 type systems at charges 10-20% lower than IBM rates on comparable systems. At present the existing rental rates offered by larger independents would just not match IBM's new pricing for the 3420 series of tape drives.

Even so, it would seem that the initial sellers' market for many independents is over. As long as they continue to offer price discounts in excess of 10% savings on monthly rental they should be able to maintain their aggressiveness in the market. And while margins in the future would appear to be smaller, if the 3400 series represents IBM's new tape drive equipment for the next three to four years, independents would certainly appear to be able to at least match or exceed the technology of the 3400 within a short period of time.

While margins may be lower, volume is just beginning to pick up for many independents. The larger competitors already have systems on the drawing board which are compatible with the 3400, but now they will be forced to price these systems closer to costs than in the past. Apparently IBM will no longer allow an uncompetitive price umbrella to exist for tape drives.

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CONTROL DATA LANDS IRS CONTRACT, FORMS JOINT VENTURE

The Internal Revenue Service has finally awarded its huge computer hardware contract described in a recent issue of EDP/IR . . . and the entire $29 million order went to a mainframe maker, Control Data. This is the contest which had independent CRT makers on tenterhooks awaiting the outcome (EDP/IR Dec. 9, 1970).

The independents' loss is Control Data's gain. It will deliver 3600 of its model 65054 low-cost terminals and ten 3300 systems over the next 18 months, and will provide maintenance for five years.

This is a timely morsel for the builder of giant computers. Cutbacks by aerospace companies, universities, and other users of large computers and the general domestic slowdown in the mainframe area have all held Control Data's earnings to a level far below that of 1969. Indeed, only its financial subsidiary, Commercial Credit Corp., kept CDC from showing an outright loss.

In its report for the first nine months of 1970, CDC projected improved shipments for the remainder of the year. EDP/IR expects the manufacturer's shipments in 1970 to be 16% lower than in 1969, and to make matters worse, a smaller share will be purchased outright.

Of all the mainframe makers, Control Data has been the most flexible in gleaning sales and service revenues from a great many sources. These include: joint ventures; hardware and software licensing agreements; OEM peripherals sales; end-user marketing of IBM-compatibles; and its Cybernet and other data center services. CDC even wholesales Cybernet services to a mainframe competitor, Honeywell.

CDC and GT&E go for brokers

In one move to patch its sagging revenues, CDC joined up with the phone company subsidiary, GT&E Information Systems Inc., to form Brokerage Transaction Services Inc. (BTSI). This new company will provide brokers with remote services from Control Data computers. The first center is already operating in New York City, and at press time BTSI was negotiating for its first customer contracts. BTSI plans to open added centers in San Francisco, Chicago, Dallas, and overseas.

The aim of the new interactive computing service is to automate most front- and back-office brokerage functions. BTSI will transmit orders from brokers' branch offices to the exchange floors, automatically match orders, and return an execution report. And in the back office, the new company hopes to get rid of the paperwork mess that plagues brokerage houses . . . or used to, before the stock market decline brought some unwelcome relief.

Brokerage Transaction Services Inc. will rely on Ultronics' sales/engineering force. Also, the GT&E subsidiary will provide terminal maintenance and communications systems design and equipment. Ultronics sales people can be expected to make the most of their extensive broker contacts -- they have 18,000 CRT terminals installed in a world-wide stock quote network. (The stock quote system will continue as an independent GT&E service, but some of the BTSI terminals may double as stockquote terminals.) According to Ultronics, some Control Data displays will be used at first by BTSI, but the long-run aim is to install Ultronics' CRTs.

Control Data's trump card is its systems experience gained through a number of computer installations in the securities industry.

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December 7, - December 11, 1970

	1970 High	1970 Low	1 week Sales in 100's	1 week High	1 week Low	Last	1 week Net Change	1 week % Change
NEW YORK STOCK EXCHANGE								
Addressograph-Multigraph	62	19 1/2	1797	25 3/8	22 3/4	24 1/2	+ 3/4	+ 3
American R & D	99 1/2	37 1/8	1216	55 1/4	49 1/2	50 3/4	- 3 1/2	- 6
Ampex Corp.	48 1/2	12 1/2	1062	18 1/4	17 1/8	17 1/2	- 5/8	- 3
Automatic D P	49 1/2	23 1/2	240	47 1/2	46 3/8	47 1/4	+ 1/4	+ 1
Bunker Ramo	14 1/2	6 1/8	1497	10 5/8	9 1/4	10 1/8	+ 1 1/4	+ 14
Burroughs	172 3/4	78 5/8	2384	115 3/4	110 7/8	110 7/8	- 4 1/8	- 4
Collins Radio	37 1/4	9	522	16 3/8	14 1/8	14 3/4	- 3/8	- 2
Computer Sciences	34 1/8	5 3/8	828	11	10 1/8	10 1/8	- 7/8	- 8
Control Data	122 1/2	28 3/4	964	52 1/4	49 1/8	50 1/2	- 3/8	- 1
Data Proc. Fin & Gen.	32	6 5/8	1033	12 1/4	10 1/2	11 1/4	- 3/4	- 6
Digital Equipment	124	48 3/4	881	69	61 3/4	63 1/8	- 4 3/8	- 6
Electronic Assoc.	11 5/8	3 5/8	219	4 1/2	4	4 1/8	- 1/8	- 3
General Electric	91 1/4	60 1/4	2382	91 1/4	86 7/8	91	+ 3 1/2	+ 4
Honeywell	152	65 5/8	1912	86 1/2	82	83 7/8	+ 2 1/4	+ 3
IBM	387	218 3/4	1879	319 7/8	311	317	+ 5 1/4	+ 2
ITT	60 1/8	30 1/2	4481	49 3/4	47 7/8	49 5/8	+ 1 5/8	+ 3
Leasco	30 1/2	7	5095	14 1/2	12 3/8	14 1/2	+ 1 1/8	+ 9
Litton	38	15 1/4	2032	21 3/8	20	20 1/8	- 7/8	- 4
Memorex	166 3/4	44 1/2	1712	83 5/8	79	80 1/2	- 2 3/8	- 3
Mohawk Data Sciences	87	18 1/8	963	28	25 3/8	26 1/2	- 1	- 4
National Cash Register	63	29 1/4	1650	37 3/4	35 5/8	36 1/4	+ 3/8	+ 1
Planning Research	53 1/4	13 5/8	650	18 3/4	16 1/2	18 1/4	--	--
RCA	34 5/8	18 1/8	2625	27 1/8	25 3/4	26 5/8	+ 7/8	+ 3
Raytheon	33 5/8	16 1/8	727	25	24 1/8	24 1/2	+ 3/8	+ 2
SCM	24 3/4	11 1/8	763	14	12 1/2	13 7/8	+ 1/2	+ 4
Sanders	29 7/8	7 1/8	208	12 3/4	11 1/2	11 3/4	- 5/8	- 5
Sangamo	29 1/8	9 1/8	175	14 7/8	14	14 1/2	- 1/2	- 3
Singer	85 3/4	53 1/4	1385	64	61 1/8	63 1/2	+ 2	+ 3
Sperry Rand	40 3/8	18 3/4	1742	25 1/4	24	24 7/8	--	--
Teledyne	40	13	3244	22 3/8	21 1/4	22 3/8	+ 1	+ 5
Telex	25 7/8	9 1/8	3213	21 3/8	19 7/8	20 3/8	- 1/2	- 2
University Computing	99 3/8	13 1/4	941	23 3/8	21 1/8	21 1/2	- 1 1/4	- 5
Western Union	48 1/4	31	286	39 5/8	38 5/8	39 1/2	+ 1 1/8	+ 3
Xerox	115 3/4	65 1/4	4629	90 7/8	85 1/8	86 1/2	- 2 3/4	- 3
NYSE COMPUTER STOCK AVERAGE							- 0.1	- 0.2
AMERICAN STOCK EXCHANGE								
Applied Data Research	24 1/4	3 3/4	91	5 1/8	4 1/2	4 5/8	- 1/2	- 10
Bolt, Beranek & Newman, Inc.	8 3/4	5 5/8	43	6 1/4	5 3/4	6	- 1/4	- 4
Calcomp	35 7/8	10 1/4	1015	35 1/4	32 1/2	34 7/8	+ 5/8	+ 2
Clary Corp.	10 1/2	3 3/8	76	4 5/8	4	4	- 5/8	- 14
Computing and Software	75 3/4	16 1/4	215	32 3/4	31	31 1/8	- 1 1/8	- 3
DPA, Inc.	10 3/8	3 3/8	156	4 1/8	3 3/4	4	+ 1/8	+ 3
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AMSE COMPUTER STOCK AVERAGE							- 0.7	- 6.6

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DASA Corp.	44	3 1/2	4 7/8	5 1/8	3 1/2	+ 1 3/8	+ 39
Digitronics	13 3/4	3 3/8	3 3/8	3 7/8	3 5/8	- 1/4	- 7
Fabri-Tek	8 1/2	2	2 3/4	3	2	+ 3/4	+ 38
Informatics, Inc.	20 1/2	4 1/4	6	6 3/8	6 1/8	- 1/8	- 2
LMC Data, Inc.	3 5/8	1	--	--	--	--	--
Management Assistance	4	1	--	--	--	--	--
Optical Scanning Corp.	52	11	13 1/2	15	15	- 1 1/2	- 10
Recognition Equipment Inc.	83 1/2	12 3/8	14 1/8	14 5/8	13	+ 1 1/8	+ 9
TBS Computer Centers Corp.	27	4	4 1/2	5 1/2	4 1/4	+ 1/4	+ 6
Tally Corp.	23	9 1/2	12	13	12	--	--

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E|D|P industry report

• THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" December 23,1970 • VOL.6,NO.3 P.J.McGOVERN, EDITOR

POTENTIAL WORLD REACTION TO PENDING TRADE BILL THREATENS INTERNATIONAL BUSINESS OF AMERICAN EDP COMPANIES

"The time has come," the Walrus said, "To talk of many things:
Of shoes -- and ships -- and sealing wax --
Of cabbages -- and computers --"

What have shoes and mushrooms got to do with U.S. companies' chances to sell computers on the world market? A lot, if the foreign trade bill now pending before Congress gets passed this session or the next -- even though this bill makes no reference whatsoever to the data processing industry.

Once a few industries are shielded by import quotas, the floodgates will be open to many manufacturers and other industry lobbiests crying, "Me too!" And if the European governments retaliate with their own protectionist measures, the effect on the U.S. computer industry could be drastic. In this issue, Dr. Reinhold Sell, Honeywell's former director of computer operations in central Europe and now a senior consultant at International Data Corp., analyzes potential repercussions of the trade bill for American EDP companies.

Charles DeGaulle, Jean-Jacques Servan-Schreiber ("The American Challenge") and numerous other prominent Europeans tried unsuccessfully during the Sixties to arouse the countries of Europe to a unified resistance against the economic takeover by American business. Where these Europeans failed, the United States government is now succeeding.

In Europe, the trade bill is considered to be an "economic declaration of war." If it is passed, severe retaliatory measures will be implemented swiftly through unified action by European governments. American companies in the data processing industry, long under attack by European protectionists, will be the prime target in this developing trade war.

The trade bill

The trade bill, also called the Mills bill after its principal architect Rep. Wilbur D. Mills, has been passed by the House and is now pending before the Senate. At press time, the bill -- now attached as a rider to the pending Social Security bill -- appeared dead for this session. Conceivably it could rear its head again at the last minute. At any rate, it is virtually certain the bill will show up again in some form on the Congressional calendar for the next session, probably as a separate item rather than hooked onto other legislation.

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The Mills trade bill is generally considered to be the most restrictive omnibus piece of trade legislation since passage of the Smoot-Hawley Tariff Act of 1930. If passed, it could mark the end of a 30 year free trade period and return to the quota system of the Thirties as the principal regulator of foreign trade.

This legislation includes the following items as principal features:

- Specific import quotas are established by law for textiles and shoes. This is primarily directed against imports from Japan, Italy and the UK.

- The "basket clause" or "trigger mechanism" which directs the President to impose quotas or higher tariffs on any foreign product which has captured more than 15% of the domestic market or where sales in the U.S. are rapidly increasing. Application of this feature today would already place several hundred products under the quota umbrella. This trigger mechanism is, of course, directed against all trading partners anywhere in the world.

- The incorporating requirements for Domestic International Sales Corporations (DISC). This device allows domestic firms to channel their exports through a special subsidiary, a DISC. Profits from sales going through a company's DISC would not be subject to income tax until they are returned to the parent company . . . a very strong financial incentive to supply export markets from U.S.-based plants rather than from foreign-based subsidiaries.

The coming trade war

The pending trade bill has done more to unify Europe and European public opinion than any other single event in post World War II history. On a recent visit to the U.S., R. Dahrendorf, the chief trade executive of the Common Market raised an ominous toast to Wilbur Mills as "the man who did the most in recent history to promote European unity."

The governments in Europe are now working out specific countermeasures to the trade bill. The Common Market Commission, top governing body of this six-country region, is already on record that retaliation by the Community would not be limited only to trade measures. While many of the details have not been discussed in public, the list of retaliatory measures is known to range from additional taxes on U.S. soybean exports to stringent restrictions on American capital movements and the establishment of U.S. companies in Europe as well as a clampdown on government purchases of American equipment like computers and aircraft.

Dahrendorf pointed out that the measures under consideration would not only inflict sharp damage on U.S. exports but would also be "in the Community's own best interest anyway." This is an open reference to the long held concern in Europe about the control of key European industries by American companies, especially the overwhelming American dominance of the computer industry in Europe. If Congress passes the bill, European governments will finally get what they have long searched for: a handy excuse for a unified clampdown on that kind of U.S. domination.

What is at stake for the computer industry

Based on EDP Industry Report data published July 27, 1970, $8.8 billion of

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computer equipment or 81.7% of all computer systems installed outside the United States were supplied by U.S.-based manufacturers. For individual countries -- including those in the Common Market, this penetration percentage is even higher, since the overall U.S. share is depressed due to the relatively strong position of locally based suppliers in both the United Kingdom and in Japan.

Table 1, reprinted from the July 27, 1970 issue of EDP/IR, shows the distribution of mainframe systems installed outside the United States by major suppliers. As can readily be seen, nearly 82% of the installed value carries U.S. company name plates. In addition, a significant share of the remaining 18% are indirectly of U.S. origin through licensing and similar fee agreements. The 4004 product line from Siemens is manufactured under a licensing agreement with RCA; the same applies to the System 4 line under the ICL label; the French CII systems lean heavily on XDS designs and nearly all of the Japanese suppliers have agreements with warious American companies. Thus, well over 90% of the equipment installed outside the United States generates income for American companies. These percentages apply not to a small and insignificant industry but to the strategically important computer industry, an industry which is rapidly approaching -- in size -- the number two spot behind the auto industry.

TABLE I -- DISTRIBUTION, BY MANUFACTURER, OF COMPUTERS OUTSIDE THE U.S.
(Estimated number and $ value of computers installed -- Jan.1, 1970)

Manufacturer	Number	%	Avg. $K Per CPU	$M Value Inst.	%
IBM	14,310	38.7	435	6,226	57.9
Univac	3,085	8.3	235	725	6.7
GE	3,685	9.9	140	516	4.8
Honeywell	1,240	3.4	280	347	3.2
CDC	575	1.6	590	336	3.1
NCR	1,980	5.3	130	259	2.4
Burroughs	535	1.4	430	230	2.1
Other American Mnfr.	2,120	5.7	75	159	1.5
U.S. Based Mnfr. Subtotal	27,530	74.3	320	8,798	81.7
ICL	3,560	9.9	215	765	7.1
Siemens	720	1.9	375	270	2.5
Philips/NVE	195	0.5	310	61	0.6
CII	250	0.7	240	60	0.6
Other European Mnfr.	700	1.9	165	114	1.1
European Mnfr. Subtotal	5,425	14.9	235	1,270	11.9
Nippon	1,550	4.2	140	217	2.0
Fujitsu	900	2.5	210	188	1.7
Hitachi	485	1.3	345	167	1.5
Other Japanese Mnfr.	1,045	2.8	125	130	1.2
Japanese Mnfr. Subtotal	3,980	10.8	180	702	6.4
INTERNATIONAL TOTAL	36,935	100.0	290	10,770	100.0

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The supporters of the Mills bill argue that the bulk of the computing equipment installed overseas is also produced overseas and, therefore, does not create American jobs and American exports. The first part of this argument is, of course, correct: the second part, however, does not stand up under examination. The overseas manufacturing operations do generate a significant volume of exports in complete units and knockdown parts from the U.S., especially in the early life of a newly designed product. Further, no American company, including IBM, can afford to manufacture in every country abroad, or even in every large one. A Burroughs computer imported into Germany is an American computer regardless of whether it is manufactured in Detroit, on the West Coast, or in Scotland.

While the overpowering dominance of the international market is most glaring in the case of general purpose EDP systems, the same is true -- to a lesser extent -- with mini and other control computers, data preparation devices, leasing activities and various types of service offerings.

The American jobs and exports depending on this international computer marketplace are huge indeed; while there is no exact count available or even possible, knowledgeable sources maintain that well over 100,000 jobs would be wiped out domestically in the computer industry alone and the net negative impact on the balance of payments would be in excess of $1 billion annually, if this international segment were eliminated or drastically reduced.

Expected retaliatory measures and their impact on the data processing industry

If the Mills trade bill is passed by Congress and signed into law by the President, the retaliatory measures by governments in Europe are expected to be severe and swift in coming. Next to farm products (soybeans), the data processing and aircraft industries will be the prime targets. These high technology industries are inviting targets for European protectionists for several reasons:

- The products and services supplied are of strategic interest to each country.
- The overpowering dominance of these industries by American companies is clear-cut and visible to everybody.
- The industries involved are among the fastest growing in the entire business spectrum.
- The equipment involved represents big ticket items and accounts for a substantial percentage of imports.
- The local companies in the field (ICL, Siemens, CII, Philips, etc.) have long been hard pressed and have been clamoring for years for government protection.

Over the years, all of the above have contributed to the development of a psychology which calls for and makes socially acceptable massive doses of government protection. In the prevailing free trade environment, overt protection was and is very difficult to justify. This dilemma under which the Europe-based data processing companies have suffered for so long may be eliminated -- if and when the Mills bill becomes law. Ironically enough, the excuse for this long sought protection from American companies is provided by none other than the U.S. Government.

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The retaliatory measures under discussion in various places in Europe and those most likely to be implemented upon passage of the trade bill are:

1. Government procurement limited to national or trade community (e.g., Common Market) based companies. This is a significant and growing share of the market since virtually all educational institutions, air and railway systems, power companies and common carriers, as well as an assortment of various other nationalized industries fall into this category.

2. Increases in import duties and/or import taxes. These additional costs are generally passed on to the customer and thus tend to make life easier on the local company. Of course, the locally producing American subsidiary is "benefitting," just as much as the native manufacturer is.

3. Various types of investment restrictions. These may be applied to established companies under foreign control as well as to the formation of new subsidiaries by American parents. This is expected to be particularly tough on the newcomers in the data entry device, leasing, used equipment marketing and EDP services fields.

4. Import quotas patterned after the trigger mechanism in the Mills bill. Circumvention of these quota provisions will require the setup of fully self-sufficient and all-encompassing manufacturing facilities in each of the trade blocs if American based companies are to continue with their marketing programs.

5. Employment restrictions. These would be along the lines of existing Swiss measures against employment of foreign nationals (people not from the European Economic Community).

The ultimate measure, gleefully eyed by the more extreme protectionists but unlikely to find sufficient support in the trade-minded countries of Europe, is Japan-type restrictions on foreign investments which make it impossible to form foreign dominated companies in designated industries.

Conclusion

The current trade bill is a measure which, economists argue, is likely if passed to inflict grave damage on many American industries. While it has probably been killed for this session, it is sure to come up again next year. The data processing industry has a great deal at stake. For the sake of protecting Pennsylvania mushroom growers and producers of shoes and textiles, an untold number of American jobs in the computer and in other high technology fields may be sacrificed. At best, the computer industry will lose the powerful boost to growth that international demand has brought in the last two or three years.

NCR AIMS NEW COMPUTER AT SYSTEM/3 MARKET

National Cash Register Co. is panting down the money trail opened up by IBM's announcement and successful marketing of the System/3 to new computer users. For this month's announcement of the Century 50 -- a disk system priced about the same as an IBM System/3 with similar features -- NCR has essentially taken the Century 100, stripped down the I/O options, simplified the software, and lowered the price.

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Before the announcement, NCR's smallest available machine was the Century 100 which, while very popular, was too expensive for most unit record shops or small service bureau customers. According to a survey EDP/IR made earlier this year, several users that ordered System/3s also considered the NCR 100, but found the price too high for their performance requirements. Now, at $1500 per month for a minimum system, the C-50 ought to hit this market dead on. It should siphon off some of the existing System/3 orders, and generate some more new business from companies that have not yet chosen any computer systems. NCR has done very well, previously, in opening up new or first-time user accounts, and its salesmen are well trained to encourage the doubtful new customer.

NCR has obvious intentions of holding on to its current base of small 310, 390, and 500 users. The C-50 would provide these customers with a good reason to upgrade with NCR, and would relieve NCR of the problems of maintenance and software for these older machines. Following are comments on the system's specs.

- The Century 50 has a minimum price of $1500 for the 16K memory, slow printer, card reader, and one dual-spindle disk (8.4 million bytes). The CPU has the same 800 nanosecond rod memory used in the C-100 and is slightly faster in most respects than the System/3, according to NCR.

- Following IBM's style, the only language NCR offers is a limited version of Neat/3, NCR's special language for simplified programming. There is a small operating system that will handle basic I/O and program errors during operation, but it offers no bells and whistles.

- The C-50 has some oddities in configuration, particularly in the card area where there is a reader (300 cpm) but no card punch. This would make it pretty hard for the current tab shop to move over directly. It also does not offer the existing System/3 user any card conversion options to handle 96-column cards, limiting orders from that direction.

Potential market

IBM's backlog for System/3 is running about 7300; there are about 3200 users with the older small NCR machines; and there are about 10,000 tab shops that do not have computers currently. This, then, is the chief potential market for the C-50. Existing Honeywell, GE, Burroughs and Univac small machine customers tend to stick with their mainframe suppliers as do NCR users; therefore, it is unlikely that many of them will be tempted to shift to the C-50.

NCR has been exceptionally active in cultivating smaller first-time users, but with the C-50 it is going even smaller than it has before to capture some new customers. IBM, however, has already broken the trail; the success of the System/3 marketing campaign proves that there is a large demand for systems in this price range among both tab users and others without computers. There are, therefore, three main targets for NCR's campaign:

- Tab equipment users. Most of these are in the IBM fan club and, since the C-50 lacks the ability to punch cards, it will take some fancy sweet-talk to convince them that a change is appropriate. However, EDP/IR estimates that a majority of this group will install some sort of computer within the next few years.

- Service bureau users. They are "on" to computer processing, but aren't so closely tied to IBM as are the unit record sites. They contribute

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over a quarter of System/3 orders. And service bureaus themselves that now use tab equipment are also very much in favor of switching to computers although again the missing card punch may be a big hinderance.

- Small computer users. Just as the System/3 replaced some of IBM's own 360/20s, the Century 50 may replace both NCR's own small users and more 360/20 users. The greater performance of the C-50 will prove especially attractive to this group, and will offer a neat competitive edge over the System/3 in upgrade situations.

The high order backlogs achieved for the System/3 in its short history give a good indication of the level of overall user interest, although the numbers are somewhat inflated by the long lag-time between System/3 orders and deliveries. This lag gives NCR a quick chance at some of the potential customers who might be tired of waiting.

IBM has about $10.4 million on order for the System/3, the 1130, and the 1401 combined. Univac has about $0.7 million on order, HIS about $0.3 million on order, and IBM has about $3.6 million on order for the 360/20. This $15 million on-order market makes a tempting feast if NCR can trap any significant portion of it. There is no way to estimate the potential for orders from current non-computer users, but it should well exceed the total value on order at present.

Comparison with System/3

NCR starts its Century 50 prices about at the mid-point of the System/3 price category. This midpoint is the most highly-populated order price range for System/3. The C-50's advantage comes in price/performance, where NCR claims distinct superiority.

Basically, the C-50 offers the same memory (either 16 or 32K), the same disk unit, the same printers, etc. as the C-100. The only limitation is the number of peripherals that can be connected (for instance, it offers only two of the two-spindle disks) and the absence of a punching capability. The new machine is fully compatible with all the company's larger Century equipment, an appealing point for a first time user.

The other limitation of the C-50 compared to System/3 is the higher starting price. A minimum System/3 rents for about $950 per month, and has only 8K of memory. NCR says the C-50 is meant for "[T]he small-computer user who has been deterred from upgrading to a powerful disk system because of cost . . ." as well as for new users. It claims processing speeds are "substantially faster" than those of the System/3. The saga begins to unfold. Apparently, the C-50's market hopes lie with users -- new and old -- who found the System/3 a little too little . . . or at least would be happy to take advantage of more power were it available for about the same price. Many -- perhaps most -- prospects won't really care about this improvement, but NCR seems to be betting that it will matter to a large number.

In short, National Cash Register Co. has taken its star performer, the Century 100, and slashed the price down to the range of its small-computer competitors. This close tailing of IBM's market strategy has never proven a bad move in the past, and EDP/IR doesn't expect it to this time. NCR is clearly hoping to pitch its sales on the basis of faster performance, upgrade potential, and cheap/simple software, rather than undercutting the System/3 itself. The company is expecting to make its first deliveries very early next year.

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December 14, - December 18, 1970

	1970 High	1970 Low	1 Week Sales in 100's	1 Week High	1 Week Low	Last	1 Week Net Change	1 Week % Change
NEW YORK STOCK EXCHANGE								
Addressograph-Multigraph	62	19 1/2	833	24 3/4	22 3/4	23 1/2	- 1	- 4
American R & D	99 1/2	37 1/8	829	50 7/8	44 7/8	45 1/4	- 5 1/2	- 11
Ampex Corp.	48 1/2	12 1/2	1021	17 7/8	16 1/8	17 1/2	-	--
Automatic D P	49 1/2	23 1/2	236	47 1/4	44 3/4	45 1/2	- 1 3/4	- 4
Bunker Ramo	14 1/2	6 1/8	668	10 1/4	9 1/2	9 3/4	- 3/8	- 4
Burroughs	172 3/4	78 5/8	2225	108 3/4	104 1/2	107 1/2	- 3 3/8	- 3
Collins Radio	37 1/4	9	255	14 1/2	12 5/8	12 5/8	- 2 1/8	- 2
Computer Sciences	34 1/8	5 3/8	1048	10	9 1/4	9 3/4	- 3/8	- 4
Control Data	122 1/2	28 3/4	1318	53	49 5/8	51 1/4	+ 3/4	+ 1
Data Proc. Fin. & Gen.	32	6 5/8	1116	11 1/8	10 1/8	10 1/2	- 3/4	- 7
Digital Equipment	124	48 3/4	1094	62 3/4	53 1/2	53 7/8	- 9 1/4	- 15
Electronic Assoc.	11 /58	3 5/8	271	4 1/4	3 3/4	4	- 1/8	- 3
General Electric	92 3/8	60 1/4	1608	92 3/8	89 3/4	91 3/4	+ 3/4	+ 1
Honeywell	152	65 5/8	1404	84 1/4	79 3/4	82	- 1 7/8	- 2
IBM	387	218 3/4	1461	316 3/4	309 5/8	315 1/2	- 1 1/2	-
ITT	60 1/8	30 1/2	3378	50 1/8	48 1/2	50	+ 3/8	+ 1
Leasco	30 1/2	7	2766	14 1/2	12 5/8	14 1/2	--	--
Litton	38	15 1/4	2483	20 1/8	18 3/4	19 5/8	- 1/2	- 2
Memorex	166 3/4	44 1/2	9277	79 5/8	51 1/4	54 3/4	- 25 3/4	- 32
Mohawk Data Sciences	87	18 1/8	924	26 1/8	23 7/8	24 5/8	- 1 7/8	- 7
National Cash Register	63	29 1/4	2034	36 3/4	35	35 7/8	- 3/8	- 1
Planning Research	33 1/4	13 5/8	826	18 1/2	16 5/8	17 1/4	- 1	- 5
RCA	34 5/8	18 1/8	2422	27 1/8	25 7/8	27	+ 3/8	+ 1
Raytheon	33 5/8	16 1/8	925	26 1/4	24 3/4	26	+ 1 1/2	+ 6
SCM	24 3/4	11 1/8	630	13 7/8	12 3/4	13 1/4	- 5/8	- 5
Sanders	29 7/8	7 1/8	255	11 3/4	10 1/2	10 7/8	- 7/8	- 7
Sangamo	29 1/8	9 1/8	189	14 5/8	13 1/2	13 7/8	- 5/8	- 4
Singer	85 3/4	53 1/4	772	64 7/8	62	64 5/8	+ 1 1/8	+ 2
Sperry Rand	40 3/8	18 3/4	6759	25 1/8	23	23 1/8	- 1 3/4	- 7
Teledyne	40	13	1695	22 3/8	20 3/4	21 1/4	- 1 1/8	- 5
Telex	25 7/8	9 1/8	22,027	20 1/2	16	16 5/8	- 3 3/4	- 18
University Computing	99 3/8	13 1/4	1075	22 3/8	20 1/2	20 7/8	- 5/8	- 3
Western Union	48 1/4	31	425	39 3/4	37 5/8	39 1/2	--	--
Xerox	115 3/4	65 1/4	2253	87 7/8	84 1/4	85 3/8	- 1 1/8	- 1
NYSE COMPUTER STOCK AVERAGE							- 1 7/8	- 4.2
AMERICAN STOCK EXCHANGE								
Applied Data Research	24 1/4	3 3/4	62	4 3/4	4 1/4	4 1/4	- 3/8	- 8
Bolt, Beranek & Newman, Inc.	8 3/4	5 5/8	21	6	5 5/8	5 3/4	- 1/4	- 4
Calcomp	35 7/8	10 1/4	4315	34 5/8	25 3/4	27 1/4	- 7 5/8	- 22
Clary Corp.	10 1/2	3 3/8	89	4 1/2	4 1/8	4 1/4	+ 1/4	+ 6
Computing and Software	75 3/4	16 1/4	262	31 1/4	30 1/8	31 1/4	+ 1/8	+
DPA, Inc.	10 3/8	3 3/8	151	3 7/8	3 1/2	3 3/4	- 1/4	- 6
Data Products	25 1/2	4 3/4	428	6 1/4	5 3/4	5 3/4	- 1/2	- 8
Granite Mgt.	22 1/4	7 3/8	137	8 3/8	7 1/2	7 1/8	- 5/8	- 8
Greyhound Computer	14 1/8	5	77	6 5/8	6	6 1/4	- 1/8	- 2
ITEL	25 1/2	6 1/8	485	16 1/4	14 3/8	14 5/8	- 1 3/8	- 9
Levin-Townsend Corp.	19 3/8	3	232	5 1/8	4 5/8	4 5/8	- 3/8	- 8
Milgo Elect.	40 1/2	15	2431	27 7/8	23 7/8	24 1/4	- 3 3/4	- 13
Potter Instrument	42 3/4	14 5/8	1859	19 1/4	15	18	- 5/8	- 3
Sys. Eng. Labs.	49 1/8	10 1/8	585	15 7/8	14 1/8	14 5/8	- 1 3/8	- 9
AMSE COMPUTER STOCK AVERAGE							- 1 1/8	- 6.7

OVER-THE-COUNTER	1970 High Bid	1970 Low Bid	December 18 Bid	December 18 Asked	1 week ago Bid	1 week net change Bid	1 week % change Bid
Aries Corp.	8	1 1/4	1 5/8	2	1 5/8	--	--
Computer Usage	8 1/2	2	5 1/4	5 5/8	5	+ 1/4	+ 5
DASA Corp.	44	3 1/2	6 1/8	6 1/2	4 7/8	- 1 1/4	- 26
Digitronics	13 3/4	3 1/8	3 1/2	4	3 3/8	+ 1/8	+ 4
Fabri-Tek	8 1/2	2	2 1/8	2 1/2	2 3/4	- 5/8	- 23
Informatics	20 1/2	4 1/4	6 1/4	6 3/8	6	+ 1/4	+ 4
Optical Scanning Corp.	52	11	13 1/2	15	13 1/2	--	--
Recognition Equipment Inc.	83 1/2	12 3/8	15	15 1/2	14 1/8	+ 7/8	+ 6
TBS Computer Centers Corp.	27	4	4 1/4	5 1/4	4 1/2	- 1/4	- 6
Tally Corp.	23	9 1/2	12	12 3/4	12	--	--

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E|D|P industry report

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"THE GRAY SHEET" December 28,1970 • VOL.6,NO.4 P.J. McGOVERN, EDITOR

More than one way to crack a market

BRISK INTERNATIONAL EDP SALES ATTRACT U.S.-BASED COMPANIES DESPITE NATIONAL GOVERNMENT RESTRICTIONS

"Computer shipments in the international (outside the U.S.) marketplace are up 25% or so this year . . ." (EDP/IR July 27, 1970).

So? By now, most everybody knows the numbers. But who are these "foreign" users so rapidly building up their stockpiles of computer hardware and software? Well, some of them are exotic names like Coca-Cola, Kaiser, Singer, Pillsbury . . . as well as the truly foreign-based celebrities -- Royal Dutch Shell, Volkswagen, British Petroleum, Hitachi, and the rest of the multinational crowd.

Multinational? That's the current buzzword which, from the American viewpoint, means: *The output of goods and services by U.S. businesses abroad is well over $200 billion annually now . . ." (The Wall Street Journal, Dec. 7) or "[F]or an estimated 80 of the top 200 U.S. corporations, foreign operations now account for at least one-fourth of sales, earnings, assets, or employees."* (Business Week, Dec. 19)

A "multinational" DP setup requires a "multinational" DP vendor, or at least it gives the world-wide supplier a distinct bonus. But the roadblocks of unique economic conditions in each country, various checks on imports and local operations, and public opinion toward American control of the world computer industry have kept computer field presidents busy thinking up ways to reach their far-flung customers.

Their concern may turn into insomnia if Congress passes the protectionist foreign trade bill now marking time in the Senate. If passed, this measure, described in the last issue of EDP/IR (Dec. 23), is likely to provoke retaliation from European and other governments. A prime target will be the U.S. computer industry -- and the American payment for protection of certain faltering industries at home may be redoubled obstacles to its EDP sales abroad. This issue surveys the many techniques U.S. data processing suppliers are using to sell in national markets ranging from the relatively "open" ones of Europe and Canada to the fast-growing, but nearly "closed" one in Japan.

National government attitudes

Right now at least, it's fairly easy to enter the computer race in Western Europe, Canada and Australia, even though certain government regulations and "native son" preferences do crop up, especially in Europe.

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Japan, on the other hand, takes the position: We'll call you when we need you. Rules on buying computers from American-based companies -- no matter where the machines are actually manufactured -- plus a cautious attitude toward foreign investment combine to make it fairly difficult to market in Japan. Even more than the European countries, Japan aims to have not just a prosperous national computer industry, but one strong enough to sell in Asia, Europe, South America, and eventually, the U.S.

There are several tools for discouraging foreign computer companies:

Tariffs. The major computer-using countries have duties on computer hardware that range from 8.8% (based on the invoiced cost) for the Common Market to 10.5-25% for Japan. These tariffs have been going down through the "Kennedy Round" of tariff negotiations. The tariffs provide some incentive for companies to manufacture within the EEC or other trade area.

Restrictions on equity. Japan is the only major country to limit the percent of a company which foreign investors may own. As a result, U.S. EDP companies can't hold more than half the stock of an enterprise in Japan, with an important exception: under a grandfather clause, IBM retains 100% control of its manufacturing subsidiary, IBM Japan, which was established before the rule came into effect. So instead of setting up subsidiaries, U.S. vendors have formed jointly-owned companies and made other arrangements with Japanese firms.

The European countries, Canada, and Australia don't have this kind of ban, at least so far as new companies are concerned. France, however, is suspicious of U.S. companies taking over local producers. General Electric and later, Honeywell, both needed permission to take over the French manufacturer, known as Compagnie des Machines Bull. GE got permission in the first place primarily because Machines Bull was in trouble financially.

Licenses to acquire computers. Japan is the only place where licenses to install "foreign" computers aren't automatically granted. And in that country, "foreign" even refers to IBM systems made by Japanese workers in a Japanese factory run by Japanese management. The criterion for getting permission is whether or not a satisfactory Japanese computer is available. In effect, this means larger machines are acquired from U.S.-based companies and smaller ones from the Japanese manufacturers . . . but the current Japanese push to develop big machines may eventually drive out even the large-scale foreign systems.

Government buying policies. In Europe and Japan, government orders account for 10% - 25% of total country demand. In most computer producing countries, the national government has a predilection for its own industry's computer products. Indeed, for some countries government demand is extremely important to the national mainframe maker. For example, the British, French and German governments all appear to favor the local manufacturer; but they don't play by hard-and-fast rules.

The many roads to Rome, Paris, Bonn, Tokyo . . .

Computer field entrepeneurs have been flexible in finding ways to butter up foreign governments, hurdle restrictions, and efficiently market hardware and software products to users in both industrialized and less developed countries. But the question is -- why go to all that effort?

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International computer use is booming, but there's more to it than that. A company which sells and services in both England and the U.S. is likely to have an advantage in each market over a vendor which operates entirely in one or the other, just as a national firm with offices around the U.S. often has an advantage over strictly local suppliers.

The major American companies -- and some giant non-American concerns -- frequently have 10-20% of their computer count installed abroad. If the ultimate choice of system is made at corporate headquarters, it's wise for the supplier to be well-established in the country where the decision is made. This may be a prime reason for putting a high powered sales office in a country, even if the supplier doesn't expect to actually deliver machines in that country. That, for instance, was a prime move for ICL setting up shop in New York, along with U.S. OEM sales.

Secondly, a user company with branches around the world may prefer a supplier who can serve many or all of his far-flung locations. Indeed, some kinds of service almost have to come from a single vendor. When companies graduate to using management information systems on an international scale, compatibility requirements will encourage use of a common DP equipment supplier, or at least good cooperation among separate suppliers.

International sales offices and subsidiaries

These are the most common channels for moving the EDP merchandise. For any complicated computer hardware, Customer Engineers, Systems Engineers, and even a local data center may be necessary for initial marketing and follow-up support. Proprietary software packages, too, may demand technical assistance from the developer or his representative. All of the major computer makers have international offices, with RCA the latecomer in direct marketing. IBM World Trade is everywhere you can think of -- 108 countries in all.

Often, direct selling is supplemented by other arrangements, particularly if there are restrictions on direct operations, or if the local market is just too thin to make a dedicated sales office worth its salt. Even in a good national market, American-based suppliers may sometimes take advantage of the marketing muscle of a local corporation.

Xerox Data Systems is just one mainframer using many approaches. In Europe and Canada it markets through its own sales staff -- as well as licensing Compagnie Internationale pour l'Informatique (CII) to produce Sigma series machines -- but it couldn't jump directly into the Japanese competition. So instead, in 1969 XDS signed a manufacturing licensing agreement with Mitsubishi. The Japanese computer maker will manufacture and market Sigma 5 and Sigma 7 systems.

Another example is the Univac Division of Sperry Rand. This is a manufacturer with strong international leanings, and it maintains sales and support centers all over the world. In Japan, though, Univac works through two joint ventures. Nippon Univac Kaisa Ltd., a joint venture with the Japanese trading company Mitsui & Co., handles sales and lease of imported Univac machines. Also, together with Oki Electric, Univac owns Oki Univac K.K. which manufactures Univac computers in Japan. In other parts of Asia, the Sperry Rand division deals with distributors. A year ago distributors in Bangkok and Hong Kong opened computer centers which would both provide service bureau services and act as equipment demonstration and backup sites for Univac customers.

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In summary, sales offices or subsidiaries are practical in "open" and densely populated (with computer users) areas. Also, business machines companies such as IBM, NCR and Burroughs have already established sales operations in a number of countries for their punched card and other office equipment. This gives them a toehold for sending out computer salesmen as well.

International service operations

One of the first in line after IBM announced its 370/155 and 165 last summer was Leasco World Trade. It ordered $60 million worth of the new large-scale machines for its European time-sharing centers. This is just one company which has made a heavy commitment to providing computer services outside the United States. Organizations which vend local or remote computing services, including the "computer utilities," have something in common with mainframe sellers: they have to spend money on a substantial data center network -- not just a string of sales offices -- if they are to develop a broad customer base.

It's obvious that anywhere a service as well as a hardware or software item is being sold, the seller has to set up shop nearby. If service (computer power, custom software, facilities management) is the major thing he sells, he doesn't have the option of contracting with a distributor to fill out the engineering or maintenance portion of the product. American-based companies find the service sectors of the EDP industry, including leasing, attractive markets in Europe, Australia, Canada, South Africa, and elsewhere.

International Telephone and Telegraph (ITT) does business data processing through a number of data centers in Europe, where it has the largest non-mainframe service bureau network. University Computing is bent on doing a hefty share of its business outside the U.S. through its European data centers (as well as through proposed centers in Latin America). And Control Data's hopes to eventually link its Cybernet centers through satellite communications are described in the special international review issue of EDP/IR (July 27, 1970).

Globally connected "computer utilities" have the same potential payoff as global operations in any computer industry sector, and maybe more. They can serve companies in their foreign as well as domestic activities. But first, of course, the customer company has to "think global" rather than each subsidiary just doing its own thing. Worldwide satellite communications, incidentally, are a current phenomenum, unlike domestic satellite links. And they extend even into countries with hardly a computer to be found (EDP/IR April 9, 1970).

Manufacturing operations

The majority of American computers sold abroad are also made abroad. IBM, Honeywell Information Systems and Univac do a lot of developmental work overseas as well. Manufacturing within national borders is a way to avoid import duties. Also, it's good public relations on two counts. First, given the fact that its businessmen use American computers anyway, the national government usually is eager to have them produced on the spot . . . sometimes even to the point of providing financial help. Furthermore, a company that sets up a manufacturing operation has publicly made a commitment to stick around for a while. Especially for relatively obscure suppliers, this aura of permanence could be vital.

The appeal of local production goes beyond just more jobs for the host country.

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It opens up the opportunity for groups to leave the original locally-producing American EDP company and form their own competing firms. In other words, manufacturing and R&D operations carried on by the outsider may give birth to some parts of a domestic EDP industry.

It is mostly the mainframe manufacturers who have built production facilities abroad, but a few peripherals and supplies companies are on the same track. For instance, Computer Machinery Corp. has gone into France to make its key-to-disk system. Caelus Memories, a subsidiary of Electronic Memories and Magnetics, has set up a European disk pack assembly and sales subsidiary headquartered in Belgium (EDP/IR Feb.4,1970), and Mohawk Data Systems is manufacturing in Germany.

Several components and memory suppliers -- Dataram, Electronic Arrays and a subsidiary of Data Products Corp. called Core Memories -- produce in Asia, South America and other areas. The same goes for the components operations of the mainframe manufacturers. This time, the incentive is usually low labor costs or local-government subsidized factory space.

Earlier this year, Control Data unveiled an important expansion into Canada of its manufacturing. It plans to invest roughly $56 million over the next five years in Canadian facilities to produce for the world market. According to CDC's announcement, about 40% will be financed through the Canadian government.

Manufacturing licenses

Licensing agreements are a favorite way to cash in on Japanese computer demand. Most of the Japanese computer manufacturers do in fact rely on American designs for at least part of their computer lines. (But the Japanese master plan is to shift more to home-grown technology.) As was mentioned earlier, XDS joined the crowd last year with a licensing agreement with Mitsubishi.

The same approach is common elsewhere too. XDS and CII, RCA and Siemens, even the former Bull-GE and the Czech government are all taking it. After all, computer technology is mighty expensive to develop from scratch, and the Atlantic and Pacific Oceans provide natural barriers to its spread via job-hopping engineers.

Two leading peripheral makers use the same licensing mechanism. Plessey of England, a mammoth concern, manufactures Bunker-Ramo's display terminals under license. And Calcomp's disk drive subsidiary, Century Data Systems, has licensed the giant German conglomerate BASF (Badische Anilin Und Soda Fabrik, to its friends), to produce its disk files in Western Europe. (Incidentally, BASF's U.S. subsidiary, BASF Systems, is an OEM customer of Century Data in the United States.)

This licensing can have interesting results. Siemens, West Germany's dominant computer company, manufactures under RCA license. (The agreement was extended this year to 1979.) But while RCA regularly gathers in its royalties, Siemen is just beginning to turn a profit on its computer operation.

Technical cooperation

When licensing is reciprocal, it becomes technical cooperation. Nippon Electric, for instance, which produces under Honeywell license, also carries out development work on its own right. Some of this technology, especially in software, finds its way to the U.S. through the Honeywell-Nippon cross-licensing pact.

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In the software area, Control Data is probably the pace setter in cooperating with foreign companies. The biggest European consulting and data services organization is Metra International. Its subsidiary, SIA International (in London and Paris) is developing time-sharing software for CDC's 6000/7000 family. In the hardware area, Control Data has stepped into a joint research venture with ICL and CII. The new Belgium-based enterprise is an outgrowth of previous technical cooperation, and the three mainframers will be on equal footing. The payoff is both in R&D savings and in more sales as the manufacturers turn to each other to fill product gaps.

Not only local manufacturing, but also software contributions by native Europeans may assist public relations. EDP/IR's sister publication, EDP Europa Report, pointed out in November one reason for CII's contributing software to Xerox's Sigma series: use of a CII-developed operating system could help open the French market to this line.

Acquisitions

Honeywell found the best way to parachute into the thriving French market: merge with the second largest supplier, Bull-GE. Although not everyone can start at the top, a widespread desire is to start as far up as possible.

The technique of buying up a local supplier appears to be used fairly often in the software and service field. Greyhound Computer used it to leap full-scale into the U.K. service bureau competition. The American-based enterprise simply bought itself a two-thirds share in Management Dynamics, billed as "one of the largest computer bureau complexes in Great Britain."

Computing and Software, the largest U.S. software company, also used this means for entering the Canadian market when it agreed to buy Aquila-BST, a Canadian data services company.

Joint enterprises

Japan is the world hot-bed of joint-venturism, so far, as the computer industry is concerned. The reason why was indicated earlier: Japan is religiously dedicated to rapid growth of a clearly domestic computer industry. Univac's joint ventures there were mentioned earlier. Another example is Ampex. This manufacturer has teamed up with Toshiba, one of the big Japanese mainframers, in a joint enterprise to make tape drives as well as non-computer items.

Diebold's subsidiary Gemini Computer Systems has gone the same route in Holland. It formed Pandata, N.V. in conjunction with three companies from outside the computer field. The Dutch partners are some of Holland's biggest computer customers. There's a similar effort underway in Canada. There, TRW is linking arms with three major computer users to form a software and services firm. The new company will start out handling the data processing requirements of its Canadian sponsors.

Four time-sharing companies have unearthed overseas partners for expanding their remote computing services to South America, Europe, and Australia. University Computing last summer announced a program to establish "computer utilities" in foreign countries by way of joint ventures, and the first fruit was an agreement with the Mendoza group of Venezuelan enterprises. The new company also may market UCC's computer equipment. Tymeshare, Inc. shoehorned into both the Canadian and French markets through joint ventures -- one with EDP Centres Ltd.

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and the other with a French bank and a French consulting firm. Com-Share and Computer Sciences Corporation are two others buying the joint venture ticket.

Distributorships and franchises

It seems like everybody and his brother signs up with foreign distributors, manufacturers' reps, or whatever. However, for many kinds of computer products the distributor must do much more than just sell. Hardware, unless it is very simple and foolproof, requires maintenance and SE support. Software packages also may demand follow-up attention from the supplier.

For example, Gemini Computer Systems, referred to earlier, has agreed to market and service National Computing Industries' software in Europe. Informatics and CTC Computer Corp. are two other companies which export proprietary packages under distributorship or franchise setups.

Minicomputers and peripherals such as CRTs and key-entry systems are other subjects of marketing-plus agreements. Systems Engineering Labs will obtain sales and support services from Radix Electronics, Ltd., of Britain. Down under in Australia, Distributors Corp. Pty. Ltd. handles systems engineering and maintenance, as well as marketing, for Sanders Associates. And Tally's teleprinter and other peripheral devices will reach French users through a French aerospace and communications company, SAGEM.

Exports to East Europe and the Soviet Union

In the past year, East Europe has captured minor headlines as a growing market for computers. The European companies Siemens and ICL are actively exporting to Russia and East Europe and U.S.-based manufacturers provide about half the Western systems sold there. However, there are restrictions. Supplies must get special licenses from the U.S. Commerce Dept. to export computer hardware of American design, and for various reasons the license may be withheld. Also, U.S. suppliers fear "bad publicity" . . . as one industry observer put it, the Eastern "Bloc" looks redder from this side of the Atlantic than from Europe. And, when U.S. manufacturers do sell to Communist countries, they don't advertise the fact.

Some say the Eastern "Bloc" is a misunderstood market. It's not really a "bloc" at all so far as computer buying is concerned. In fact, there is a lot of variation as to how EDP procurement is handled by the different countries, although it is always through a central authority. And of course some countries such as Hungary are wealthier than others, and thus likely to be better computer markets.

American manufacturers are making minor computer exports to Communist buyers, and American technology is being exported indirectly through oversees licensees such as Siemens. The Export Control Act gives the Commerce Dept. authority to approve or veto these exports. The Act extends in theory to any U.S.-designed machines manufactured by foreign companies, but it may be a political matter whether it gets strictly enforced with respect to foreign manufacturers.

Permission to export to Eastern Europe depends on several criteria. One is the end-user and the application. Another is the sophistication of the hardware. In practice, large-scale machines above the 360/50 size don't get licenses, although the Commerce Department makes decisions on a case-by-case basis and there are no clearcut rules.

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The following comments indicate some differences between Eastern Bloc countries:

- Russia, by far the biggest computer user among them, is more anxious to manufacture its own computers than to import. This year it talked to IBM about setting up a production plant in the USSR, but apparently nothing has come of the negotiations.

- Other East European countries are better prospects for actual sales of computers. But they are also interested in manufacturing them. There is at least one instance of technology licensing by an American-controlled company. In the late '60s, Bull-GE licensed Czechoslavakia to manufacture the GE 130 and 140; these are computer models never commercially produced by GE because they weren't compatible with other machines in GE's product line. Bull-GE (now part of Honeywell Information Systems) has sold the Czechs several $ Million worth of parts for these systems.

- Yugoslavia, although sometimes considered part of the Communist Bloc, is really a separate case altogether. It is quite easy to obtain permission for export of computers to this country.

BLOWING OUR OWN HORN

WORLD WIDE GROWTH FORECAST FOR
INSTALLED VALUE OF U.S.-BASED COMPUTER COMPANIES

	Value of computers in use ($ Billions)		
	1964	1969	1974 (est)
United States	$ 6.1	$21.9	$47.9
International	1.8	8.9	23.0
Totals	$ 7.9	$30.8	$70.9

Need we say more? EDP/IR's sister publication, EDP Europa Report, does say more about the thriving European market. This newsletter for executives concerned with the EDP industry is published 24 times a year. It is prepared in London by people in daily contact with the computer industry and EDP customers. To receive a sample copy or to start your subscription, please fill in the reply card enclosed with this issue and mail it to EDP Industry Report, or call us at 617/969-4020.

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E|D|P industry report

• THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" DECEMBER 31,1970 o VOL.6,NO.5 P.J.McGOVERN,EDITOR

Here come the biggies!!

MAJOR U.S. CORPORATIONS DIVERSIFY INTO THE COMPUTER INDUSTRY AS CASH NEEDS HIT SMALLER COMPANIES AND NORMAL FINANCIAL CHANNELS CONTINUE TIGHT

1960 -- McDonnell Automation Company founded;
personnel, 253; equipment value, $7 million.

1969 -- Personnel, 1525; equipment value, $47 million; sales, $37 million.

1970 -- McDonnell Douglas Automation Company formed;
personnel, over 3000; equipment value, more than $125 million;
sales for 1971 expected to exceed $100 million.

This new division of McDonnell Douglas Corp. -- which combines the computer services organizations of Douglas Aircraft Co. and McDonnell Douglas Astronautics Co. -- is now the largest computer service bureau operation in the world. More importantly, it is a pioneer in an area of business activity that today many giant corporations are entering. Leading companies in the aerospace, insurance, automotive, and utility businesses are beginning to stake out claims in various portions of the computer industry. Examples of this -- taken from Fortune's list of "top" companies -- are listed in the tables in this issue of EDP Industry Report.

The exact reasons behind this activity are as diverse as the individual companies involved; their essence, however, is usually the chance to contribute working capital and management skills and/or the desire to diversify into a rapidly growing industry. Though many traditional sources of capital may see gloomy short-term futures for the computer industry, cash-rich corporations see growing opportunities to reap huge returns on investment over five- or ten-year periods. There are several major paths these companies are taking:

- o Acquisition. With either cash purchases or stock swaps, healthy companies are simply adding a computer subsidiary to their organization. GT&E, for example, recently purchased Tempo Computers, Inc., a minicomputer manufacturer. Tempo was reported in a very serious cash position as orders were postponed or many customers requested to lease their computers rather than to purchase.

- o Merger. Occasionally, two similar sized organizations realize that they can gain needed talent, increase efficency, or reverse a poor cash flow situation by pooling their interests. The 1970 Honeywell-GE merger is a prime example of such a situation.

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o Investment. Highly "conservative" companies are making substantial venture investments in newer computer industry firms that offer the potential of long-term profits. For example, Singer Co.'s venture capital group, Diversified Technology, recently financed Cogar Corp. (a memory manufacturer) to the tune of $6.5 million. If Cogar makes a go of its promising future, it could become another piece of the emerging Singer compuglomerate (see page 6).

o Spinoff. On an increasing basis, large companies are turning their own computer operations into computer subsidiaries and, hopefully, additional profit centers. This seems particularly appealing to aerospace companies, as the early move by McDonnell illustrates. And just this week, Boeing has announced a similar step. Boeing Computer Services Corp. will start business with some 2700 employees and the huge computer complex so necessary to an aerospace company. Additional moves in this direction can be anticipated as Federal spending in this area provides less and less support.

With outside entries such as those mentioned and others listed on pages 4 and 5, it is obvious that the computer industry has been "recognized." Companies with large investments in hardware and software -- airlines, insurance, manufacturing giants -- are attempting to turn this investment into a profit center as well as a service center. Other companies, faced with sales slumps and profit plunges, want their piece of the computer pie as well.

Indicative of a dilemma?

On the surface such activity would appear rosy for an industry. But this entry of outside forces raises the proverbial question posed about the computer industry: "Can traditional management skills, considered the forte of the large corporation, turn high prospects to profit in the computer industry?"

This question has been raised more than once by EDP/IR in its discussions of General Electric's entry in the mainframe market. Now, in that particular case, the answer has been given by action, and the answer was a resounding "No" to most outside observers. At the very least, it was an admission that the continued investment required was more than would be committed. To date, in fact, most of the effective executive talent in the computer industry has come from one source -- IBM -- either directly or through careful study of its methods.

Other companies in the industry -- Burroughs, Honeywell, and NCR -- have faced up to the problem in the past. After testing the traditional techniques and having problems, the successful companies have faced the fact that the computer industry is so different and fast-changing that computer activities essentially determine the management structure. Honeywell, for example, essentially reorganized around its computer operations acquired in the early days of the industry.

So as large corporations venture into the computer arena they face new management decisions. In most cases, the stake in computers is relatively small compared to the size of the company and may be relegated a minor position. If this means simply a necessary budget and "hands-off" approach, the computer operations could continue well, keeping up with anticipated industry growth. If, however, traditional business philosophies rub off and established management gets involved, the result could be a slackening of agressiveness and start to drag parts of the industry down.

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Walking in the Giant's shadow

The computer industry may not be mature; it may or may not even be approaching maturity. But certain characteristics for success are clear. From continuing studies conducted by the Corporate Planning Service of the International Data Corporation, publisher of EDP/IR, guidelines have been suggested for a company evaluating its possible entry into the business, or for the investor examining the business of a company that has.

For a hardware manufacturer, there are important considerations in addition to cleverness or technological ingenuity:

- o Is the product geared toward rental? Most customers are, and system manufacturers this year have received about 85% of their revenue from rentals. But to establish a rental base, the manufacturer must have adequate financing to ship products for several years before revenues match costs.

- o Can the company maintain the product or provide for good maintenance from an independent source? Without good service and other user support, customers change brands pretty fast.

- o Can the company offer a wide range of products and continue to develop new ones on a regular basis? Product obsolescence comes along on a regular basis. Also, existing customers are a good source for continuing new business.

For software companies, the rules are slightly different, although many of the above considerations apply. Support can be very expensive, so the product must have appeal to a large number of users. Also, if the product requires any sort of regular updating, it's better to rent than to sell, with maintenance costs figured into the supportive costs.

For service operations, the considerations are different, but much more like those of more normal businesses:

- o Is the service properly centered, geographically, to provide a sufficient number of customers? If not, it won't make money.

- o Does the service cater to a particular industry? If it does, it can't require the customer to change his way of doing business; if it does, he simply won't accept the service.

In all of these types of business, naturally, the costs of marketing and providing service must be carefully considered. This point, while it seems obvious, is one of those most often overlooked by a company entering the computer business. Even many people who operate computers don't know the extent of the supplier's hidden costs for support.

Many of the companies listed on the following pages are just entering the computer business, and more established ones normally don't break out profit and loss figures so their success cannot be readily determined. But the known successful operators have properly applied these factors. As the nation's major companies move into the computer industry, it will be interesting to see if they can. The ones that don't will probably become apparent: They'll get out.

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MAJOR COMPANIES VENTURING INTO THE COMPUTER ARENA

Listed on these two pages are some of the nation's top corporations that have diversified into the computer industry through acquisition, merger, investment, or spinoff. The list is by no means complete nor does it necessarily list all of a company's computer-related activities. The categories Services, Hardware, or Software generally describe the affiliate company's business.

PARENT	SUBSIDIARY	FUNCTION
	Services	
Aetna Life Insurance	Span Data Processing Center	service bureau
American Airlines	Reservations World	hotel reservations
Avco Industries	Avco Computing Services	service bureau
Bank of America	BankAmericard Service	service bureau
Boeing Aircraft	Boeing Computer Services	service bureau
Boise-Cascade	Boise-Cascade Computing	service bureau
Castle & Cooke	Computer Information Services	service bureau
CNA Financial	CNA Computer Services	service bureau
Continental Insurance	Continental Insurance Services	service bureau
International Paper	Bradford Computer Systems	management services
IT&T	ITT Data Services	time-sharing
Lever Bros.	Lever Data Processing Services	service bureau
McCall	McCall Information Services	data base service
McDonnell Douglas	McDonnell Douglas Automation	service bureau
Mead Corp.	Data Corp.	special services
North American Rockwell	NAR Information Systems	special services
Northwest Bancorporation	Northwest Computer Services	banking services
Pepsico	Chandler Leasing	computer leasing
Scott Paper	Industry Computing Systems	N/C services
Travelers Insurance	Randolph Computer	leasing
United Utilities	United Computing Systems	service bureau
Wells Fargo	Wells Information Services	service bureau

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Westinghouse	Westinghouse Telecomputer Systems	time-sharing
W. R. Grace	Multicomp	time-sharing

HARDWARE

AT&T	Teletype Corp./Western Electric	terminals
Bendix	Logitron	terminals
Cincinnati-Milicron	Industrial Products Group	minicomputers
Corning Glass	Corning Data Systems	terminals
Ford Motor Co.	Philco	components
GT&E	Sylvania/Ultronics	terminals
Gould	Clevite	components
Litton Industries	Litton Business Systems	commercial products
Lockheed	Data Products Division	minicomputers
MCA, Inc.	MCA Technology	terminals
Motorola	Instrumentation&Control Division	components
Singer	Friden Division	commercial products
Texas Instruments	Industrial Products Division	peripherals
USM Corp.	Spiras Systems	minicomputers
Xerox	Xerox Data Systems	computers

SOFTWARE

American Cyanimid	Decision Making Systems	general software
Burlington Industries	Burlington Management Services	system design
City Corp.	CitiCorp Systems	banking software
Continental Telephone	National Computing Industries	packaged software
Cummins Engine	Management Information Systems	MIS packages
Mead-Johnson	M/D Systems	retrieval packages
Pillsbury	Pillsbury Management Systems	languages, packages
TRW Group	TRW Systems	custom software
U. S. Steel	USS Engineers & Consultants	custom software

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This company tries anything...once.

Of the many companies getting their feet wet in the computer industry, Singer shows signs of being the most agressive, and the most willing to experiment. It is currently engaged in internal product development with its Friden Division; it is actively seeking new companies or established companies that can be acquired; it is busily sowing seed money through a venture capital outlet for the corporation's loose cash.

Singer is out to beg, build, and borrow a compuglomerate, and is willing to take risks and spend money to do it. This whole venture is being built around the company's Friden division, a company that has an established name in the desk calculator business but found the competition getting too tough for comfort. The marketing people obviously realized that there was a pretty close relationship between office products customers and small commercial computer customers, so the company is trying to make the switch as quickly as possible. Also, the profit patterns for computer products look much more attractive than the standard GNP growth rate more common in consumer product areas.The possibility of a continued 15% growth can justify a large capital risk, if the company's management is aggressive enough, and can grasp the speed with which things seem to happen around computers. Singer's overall corporate plan involves expanding the company into as many high-growth areas as possible, building a sewing machine company into the 45th largest corporation in the U.S.

Minidwarf vs. Snow White and the Gang

Just to be sure it is being noticed, the Friden Division is taking competitive swings at most of the prestigous names in the business -- IBM, NCR, Mohawk Data Sciences, and Xerox -- each in its own home territory, as well as a nameless host of well-placed smaller vendors of computer products. Here's a short rundown on the segments Friden has invaded:

- o System 10, a minicomputer system that is aimed straight at IBM's very lucrative small commercial business. The market includes the small, first-time user and the large customer who wants to dedicate a small machine to a single local job. The machine has been well-received, and backlogs are supposed to be very healthy.

- o Friden's Collect-A-Data had already established a foothold in the point of sale data collection area. Last September, it announced its new system, built around the System 10 and including its own terminals and software. The company is already claiming several million in new orders for the system, as well as upgrade orders from old customers.

- o A less popular product has been the Magnetic Data Recording System, announced earlier this year. The unit competes well with Mohawk and Honeywell, but, being a pooled key to tape system, lacks much of the appeal of the more sophisticated keyprocessing systems like Inforex. Friden could supplant the originator of the concept, Mohawk, but it must introduce a more formidable product to get a hold on any sizable market share.

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- Taking NCR by suprise, Friden introduced, and immediatly delivered, its Modular Data Transaction System(MDTS). The unit, a point of sale data recording system, is aimed at what has been an NCR-owned market for several years. The strategy for that little coup was developed by the current product manager, a recent NCR alumnus.

- Friden has also installed several hundred of its 9311 disk drives, replacing installed IBM 2311s. This product line, too, has its problems. Users are rapidly moving away from the 2311-type drive towards the more economical, and better-performing 2314/2319-type product. Friden has not, as yet, made any announcements of such products. Unless it does, it may discover that its end run into the disk drive market simplywon't score.

- In taking on Xerox, Friden had to admit defeat. Though not Friden's fault, it didn't anticipate IBM's sudden entry into the office copier market, the sudden loss of interest in low-cost, low-quality copiers made the company's market position untenable. Friden had entered the copier market in 1968, and set itself the goal of being number 2 in the business within 5 years. That can be hard when you have to face both IBM and Xerox all the way.

Friden has also announced terminals, communications hardware, and other office product equipment such as phototypesetting equipment and billing machines. Some of these products have resulted from traditional development work within Friden, others have resulted from the buying of talented groups from outside the Singer empire, and still others have come from acquisitions. In all cases, Singer is using its leverage as a financial holding company to build Friden, as near overnight as possible, into a giant computer operation with broad product lines, nationwide service operations, and point-of-sale equipment. Friden expects to be both able and willing to compete with the whole general-purpose computer industry, before long.

There are many possible weaknesses resulting from any such rapid buildup of new product areas and new skills. The company has pirated product managers from existing companies, provided executive and financial skills from existing expertise with the Singer group, and has brought in talented newcomers through its policy of acquisitions. None of these things, however, can cause adding machine salesmen to become instant computer experts. Nor can they create a national field support and maintenance operation that is trained in all these new products and has a national reputation overnight. The company admits that it has taken a full year to get its staff of dedicated System 10 people over the 100 mark.

Still peanuts to Singer

The whole of what Singer describes as the "Systems and Data Communications" portion of Singer only contributes 5% of the company's nearly $2 billion in revenues(1969.) One-third still comes from the sewing machine business, which is still growing faster than the economy, but that "Systems" sector is growing at about 15%.

Apparently well-aware of the needs of the capital business, Singer is also involved heavily in direct capital ventures. Its subsidiary, Diversified Technology Corp., has just financed Cogar Corp.(a memory company) and is seeding several other firms that might later yield high profits for Singer's acquisition mill.

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December 21, 1970 - December 24, 1970

	1970 High	1970 Low	1 Week Sales in 100's	1 Week High	1 Week Low	Last	1 Week Net Change	1 Week % Change
NEW YORK STOCK EXCHANGE								
Addressograph-Multigraph	62	19 1/2	616	25 3/8	23 1/4	25 3/8	+ 1 7/8	+ 8
American R & D	99 1/2	37 1/8	1230	47 7/8	43 3/4	47 3/4	+ 2 1/2	+ 6
Ampex Corp.	48 1/2	12 1/2	844	18 1/2	17	18 1/4	+ 3/4	+ 4
Automatic D P	49 1/2	23 1/2	260	45 7/8	43	44 3/8	- 1 1/8	- 3
Bunker Ramo	14 1/2	6 1/8	470	10 1/4	9 5/8	10 1/4	+ 1/2	+ 5
Burroughs	172 3/4	78 5/8	1478	111	107	108 3/4	+ 1 1/4	+ 1
Collins Radio	37 1/4	9	470	13 5/8	12 1/4	13 5/8	+ 1	+ 8
Computer Sciences	34 1/8	5 3/8	664	9 7/8	9 1/8	9 1/2	- 1/4	- 3
Control Data	122 1/2	28 3/4	809	51 3/4	49 7/8	50 1/2	- 3/4	- 2
Data Proc. Fin. & Gen.	32	6 5/8	490	11 3/8	10 1/8	11 1/4	+ 3/4	+ 7
Digital Equipment	124	48 3/4	613	63	54 3/4	62 7/8	+ 9	+ 17
Electronic Assoc.	11 5/8	3 5/8	384	5 1/2	4	5 3/8	+ 1 3/8	+ 34
General Electric	92 3/8	68 1/4	1779	92	89 1/8	90 3/4	- 1	- 1
Honeywell	152	65 5/8	798	83 3/8	79 1/2	82	--	--
IBM	387	218 3/4	1641	318 3/4	311	315	- 1/2	--
ITT	60 1/8	30 1/2	2137	50 3/4	49 1/2	50 3/8	+ 3/8	+ 1
Leasco	30 1/2	7	3004	15 1/2	13 3/4	15 1/4	+ 3/4	+ 5
Litton	38	15 1/4	1331	20 7/8	18 7/8	20 7/8	+ 1 1/4	+ 6
Memorex	166 3/4	44 1/2	3126	64 3/8	60 3/4	61 3/4	+ 7	+ 13
Mohawk Data Sciences	87	18 1/8	368	26 3/8	24 5/8	25 7/8	+ 1 1/4	+ 5
National Cash Register	63	29 1/4	1742	38	35 3/8	37 7/8	+ 2	+ 6
Planning Research	53 1/4	13 5/8	521	18 1/8	17	17 5/8	+ 3/8	+ 2
RCA	34 5/8	18 1/8	1607	27 1/4	26 1/2	26 3/4	- 1/4	- 1
Raytheon	33 5/8	16 1/8	547	26 7/8	25 3/4	26 3/8	+ 3/8	+ 1
SCM	24 3/4	11 1/8	643	13 1/2	12 5/8	13 3/8	+ 1/8	+ 1
Sanders	29 7/8	7 1/8	352	11 7/8	10 1/8	11 5/8	+ 3/4	+ 7
Sangamo	29 1/8	9 1/8	308	13 7/8	12 5/8	13 3/8	- 1/2	- 4
Singer	85 3/4	53 1/4	553	65 1/4	64	64 3/4	+ 1/8	--
Sperry Rand	40 3/8	18 3/4	1441	24 7/8	23 1/8	24 5/8	+ 1 1/2	+ 6
Teledyne	40	13	1407	21 3/4	20 1/2	21 1/2	+ 1/4	+ 1
Telex	25 7/8	9 1/8	2872	17 5/8	16 3/8	16 7/8	+ 1/4	+ 2
University Computing	99 3/8	13 1/4	751	22	20 3/8	21 1/2	+ 5/8	+ 3
Western Union	48 1/4	31	682	42 1/4	39 5/8	42	+ 2 1/2	+ 6
Xerox	115 3/4	65 1/4	3187	86 3/4	81 1/2	85 7/8	+ 1/2	+ 1
NYSE COMPUTER STOCK AVERAGE							+ 1.0	+4.2
AMERICAN STOCK EXCHANGE								
Applied Data Research	24 1/4	3 3/4	66	4 1/2	4	4 1/2	+ 1/4	+ 6
Bolt, Beranek & Newman, Inc.	8 3/4	5 1/8	46	5 5/8	5 1/8	5 3/8	- 3/8	- 7
Calcomp	35 7/8	10 1/4	779	28	26 1/8	26 5/8	- 5/8	- 2
Clary Corp.	10 1/2	3 3/8	78	4 1/4	4	4 1/8	- 1/8	- 3
Computing and Software	75 3/4	16 1/4	145	31 3/4	29	29 3/4	- 1 1/2	- 5
DPA, Inc.	10 3/8	3 3/8	141	3 7/8	3 1/2	3 7/8	+ 1/8	+ 3
Data Products	25 1/2	4 3/4	690	6 3/8	5 5/8	6 3/8	+ 5/8	+ 11
Granite Mgt.	22 1/4	7 3/8	193	8 1/4	7 1/2	8 1/8	+ 1/4	+ 3
Greyhound Computer	14 1/8	5	155	6 1/4	5 7/8	6 1/4	--	--
ITEL	25 1/2	6 1/8	295	16	14 1/4	15 7/8	+ 1 1/4	+ 9
Levin-Townsend Corp.	19 3/8	3	260	5	4 3/8	5	+ 3/8	+ 8
Milgo Elect.	40 1/2	15	522	25 3/8	24	24 1/2	+ 1/4	+ 1
Potter Instrument	42 3/4	14 5/8	235	18 1/8	17 1/2	18	--	--
Sys. Eng. Labs.	49 1/8	10 1/8	347	16 1/4	14 5/8	16 1/4	+ 1 5/8	+ 11
AMSE COMPUTER STOCK AVERAGE							+ 0.2	+2.5

	1970 High Bid	1970 Low Bid	December 24 Bid	December 24 Asked	1 week ago Bid	1 week net change Bid	1 week % change Bid
OVER-THE-COUNTER							
Aries Corp.	8	1 1/4	1 3/8	1 3/4	1 5/8	- 1/4	- 16
Computer Usage	8 1/2	2	5	5 1/2	5 1/4	- 1/4	- 5
DASA Corp.	44	3 1/2	5 1/2	5 7/8	6 1/8	- 5/8	- 10
Digitronics	13 3/4	3 1/8	3 3/8	3 7/8	3 1/2	- 1/8	- 4
Fabri-Tek	8 1/2	2	2	2 3/8	2 1/8	- 1/8	- 6
Informatics, Inc.	20 1/2	4 1/4	7 3/8	7 3/4	6 1/4	+ 1 1/8	+ 18
Optical Scanning Corp.	52	11	12 1/2	13 1/2	13 1/2	- 1	- 7
Recognition Equipment Inc.	83 1/2	12 3/8	14	14 1/2	15	- 1	- 7
TBS Computer Centers Corp.	27	4	4 1/2	5	4 1/4	+ 1/4	+ 6
Tally Corp.	23	9 1/2	11 3/4	12 1/2	12	- 1/4	- 2

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E|D|P industry report

• THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" JANUARY 15, 1971 • VOL.6,NO.6 P.J. McGOVERN,EDITOR

KEY-TO-DISK INSTALLATIONS GROWING RAPIDLY AS KEY-TO-TAPE LEVELS OFF; IBM'S BUFFERED KEYPUNCH IMPLIES NO DIRECT COMPETITION FORTHCOMING

Just six years ago -- when IBM introduced System/360 and heralded the "third generation" of computers -- input techniques had changed little from those developed by Dr. Herman Hollerith to handle the 1890 U.S. Census. With few exceptions, input data for computers first had to be punched onto a card or paper tape.

During the latter half of the 1960s, a few other techniques began to show up often enough to be counted: Much was said if not done about OCR; direct input -- via teletypewriter, CRT, or data collection device -- appeared for many applications; and data recorders, or key-to-tape devices, began to replace the keypunch in many business applications.

Today -- as the single-station key-to-tape device begins to peak in popularity except in communications applications -- another type of keypunch and card replacement seems to be the star on the input horizon. It's called a key-to-disk, or shared-processor system. In essence, it involves several keyboards connected to a special-purpose computer or logic box that collects input, verifies it, formats it, and dumps it onto a tape or disk . . . ready for processing.

During 1970, in fact, the population of shared-processor input systems grew from virtually nothing to almost 400 worldwide, some 70% to 75% of them in the U.S. And, since the average system has eight or more keyboards, these systems are currently doing the input work of 3000-to-4000 keypunches and associated verifiers. With use of these systems expected to more than double in each of the next few years, EDP Industry Report in this issue takes a closer look at the key-to-disk situation . . . and the entire computer input environment in which it exists. At least three forces are involved:

- The total number of keypunches will increase slightly over the next several years, but more than half will be for IBM's System/3 or will be the new buffered types such as IBM's 129 and Univac's 1700 series.

- The installation rate of key-to-tape units is already on the decline, with communications oriented units accounting for most current shipments.

- Shipments of key-to-disk systems started to take off in 1970, and should parallel key-to-tape growth rates of the late '60's for a few years. But a peaking out is already being anticipated as direct input and/or OCR finally gain momentum by the mid-1970s.

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The expected growth of the data capture equipment market, and the interrelationships between equipment types are illustrated in the following table, prepared by the International Data Corporation, publisher of EDP/IR.

OFF-LINE U.S. DATA CAPTURE EQUIPMENT MARKET				
	1969		1973	
	Number Installed	$M Value Installed	Number Installed	$M Value Installed
Keypunches *	224,000	$ 670	254,000	$1150
Verifiers	93,000	175	62,500	125
Key-to-Tape (Keyboards)	28,000	320	69,000	800
Key-to-Disk (Keyboards)	350	7	22,500	280
OCR	2,200	270	6,000	460
MICR	3,500	250	4,400	360
Data Collection	36,700	120	109,000	430
TOTALS	387,750	$1812	527,400	$3605
* Includes System/3 Keypunches and buffered unit: (Univac 1710, IBM 129)				
Data Copyright 1971 by International Data Corporation				

Input and IBM

The visible symbol of computers, at least to the average person, is the "IBM card." Properly called the Hollerith card, this predecessor of data processing is not about to disappear, as the table above illustrates. IBM's success dates back to its success with punched cards in the 1930s and 1940s, and even today unit record equipment -- much of it out of production for more than ten years -- brings some $30 million a month into IBM coffers from U.S. customers alone.

As it moved into the computer business, IBM used its punched-card equipment "bank" or "money machine" to finance the new rental base. Sales and rentals of unit record equipment (including keypunches) still contribute over 10% of IBM's total revenue. It is easy to see, therefore, why IBM apparently has dragged its feet as other firms started the big push toward key-to-tape input a few years ago.

IBM did offer the Model 50, an input device based on its MT/ST that records data on spools of half-inch tape which are subsequently pooled onto computer-compatible tape before use. IBM never gave this much of a marketing push, although it has captured about 8% to 10% of the key-to-tape market. But it hasn't really moved to impact its punched-card input base.

And with the introduction of the Model 129 keypunch/verifier (EDP/IR Nov.6,1970) IBM seems to be saying that it is going to stay with the punched card for awhile. The 129 is truly a way of protecting IBM's customer base. In particular, it was a reaction to Univac and its 1710 buffered keypunch/verifier. By yearend 1970,

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20,000 of these units were installed in the United States. So IBM's announcement should have been anticipated: When a product begins to nibble away 10% or so of an area where IBM is dominant, IBM usually reacts.

IBM, to date, hasn't reacted to the key-to-disk situation, and many observers interpret the 129 as an almost sure sign that it won't. The bulk of IBM keypunches installed are the Model 029, and EDP/IR understands that IBM can factory retrofit these into 129s. IBM, thus, won't worry about impacting its own base. And when it decides to move away from the punched card -- probably several years hence -- IBM probably will go to some type of direct input . . . possibly a cluster of keyboards feeding a System/7 processor that is on line to the central computer. Others see IBM moving to a system that uses input documents typed with a special font on a Selectric typewriter, then fed on line to the system through an OCR terminal. In any event, few people expect IBM to move into the key-to-disk market as it exists today. Naturally, it could if it wished.

One of the few markets where IBM isn't

It's rare in the computer business to find a submarket where IBM doesn't at least have a plurality. This was essentially the case in key-to-tape and at present is true of key-to-disk. Many smaller companies have announced entries in this market, and others are still to come. Just this week Cogar Corp. announced an "intelligent" data entry system unit that can operate stand-alone or can be clustered into something like a shared processor system. Other companies -- Logic Corp., Redcor, and SEL, for example -- have also announced entries. But right now, as 1971 begins, there are really only three major competitors . . . with one more waiting in the wings:

- Computer Machinery Corp. has a Key Processing system that can handle up to 32 individual keyboards. In September of 1970, the company announced the installation of its 100th system at the U.S. Chamber of Commerce. The yearend figure is pegged at about 150 systems by people in the key entry business. Realizing the international nature of the computer -- and therefore the computer entry -- market, CMC already has a manufacturing operation in London and plans to start up in France within the next few months.

- Consolidated Computer International Inc., a wholly owned subsidiary of Consolidated Computer Ltd. of Toronto, has been installing Key-Edit systems in the U.S. while its parent delivers in Canada and Britain. Operating from Canada has been financially beneficial for Consolidated, since the government is financing 90% of the company's requirements up to $12 million and is underwriting 50% of the company's development costs. Already, Consolidated has shipped almost 100 systems and has its sights set on some 300 for this year. During the fall of 1970, Consolidated announced a $50 million sales agreement with International Computers Ltd. which will purchase 500 Key-Edit systems over the next three years. Consolidated's systems also handle up to 32 keyboards, although 10 to 20 has been more typical of systems installed to date.

- Inforex, Inc.'s Intelligent Key Entry System handles only eight keyboards per system, but the price is competitive with fully loaded larger systems because Inforex manufactures most of its components and uses a special-purpose hard-wired "computer" rather than a commercially available minicomputer. The company is installing its 200th system this week, and is producing systems at the rate of 10 to 12 a week.

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ESTIMATED U.S. KEY-TO-DISK MARKET: 1970-1975

Year	Systems		Keyboards		
	Shipments	In Use	K'bds/System	Shipments	No. in Use
1970	300	350	8	2400	2,750
1971	600	950	10	6000	8,750
1972	750	1700	9	6750	15,500
1973	875	2575	8	7000	22,500
1974	1000	3575	7	7000	29,500
1975	1000	4575	6	6000	35,500

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- Honeywell Information Systems, Inc. later this month will begin deliveries of its Keyplex system and reports a "substantial backlog of orders in every major industry." EDP/IR estimates that HIS soon will be delivering 25 to 30 systems a month. The Keyplex system will handle up to 64 entry stations, so it is more competitive with the CMC and Consolidated units than with Inforex. Honeywell makes its own minicomputers and other components, so it should offer better pricing or produce greater profits on its systems.

Financing the product

The market for key entry devices is, primarily, one of replacing keypunches. And thanks to IBM's many years of effort, most users are accustomed to renting rather than buying. Thus, once a company's hardware works, its success depends on the ability to finance the product it sends out into the field. Honeywell, of course, has a large base to support its activity, and therefore should have no problems. The smaller companies, on the other hand, must provide outside rental or lease arrangements. CMC has a sales-leaseback arrangement with Bank of America; Inforex recently concluded an agreement with United States Leasing International; and Consolidated, with a line of credit at The Chemical Bank of New York, reportedly is working out an arrangement with a subsidiary of Ford Motor Co.

Prospect for growth

As the table above indicates, the key-to-disk market can expect a healthy growth during the next few years; and the figures shown are estimates only for the U.S., so another 25% or more can be expected abroad. Even though all major competitors today -- except for Inforex -- have systems pegged to 32 or more input stations, the average number of keyboards per system is expected to decline after this year because it is almost certain that smaller systems will be introduced. Also, only 16% of computer sites have more than 10 keyboards, and many have converted to key-to-tape or decided to use buffered keypunches.

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And there is always the big question mark called IBM. Traditionally, when a competitive product has begun to take much more than 10% of a market, IBM has moved. Thus, as the figures show, 1974 would be the time when another major move can be expected from the industry giant. Odds are it will be toward some type of direct-entry system, possibly feeding a processor that is part of a distributed computing system, on line to the main computer.

COGAR PLUNGES INTO KEY-ENTRY COMPETITION

Cogar Corp., the three-year old manufacturer headed up by a Mohawk Data Sciences co-founder, has just entered the high-stakes game of end-user marketing. The company, which has been selling semiconductor memory systems to mainframe manufacturers (including IBM), kicked off this week with four new products. The most exciting right now is probably its data entry system, but the semiconductor memory rates as a major new peripheral product, too. Here's a quick sketch of the products:

- Cogar's data entry system also might be called an intelligent terminal. At $120/month rental, the processor-based unit promises to compete both with stand-alone key-to-tape and with key-processing units, at least at smaller key-processing installations.

- The Cogar 4 minicomputer is basically an upgraded data entry system. Indeed, the user can do his own upgrading by hanging on memory modules. One of the mini's using semiconductors, it has a very fast 300 nanosec cycle time, 8-bit bytes, and a $14,400 purchase price with 16K of memory.

- The "multi-mini" is a fancied up version of Cogar 4. Such a system might include a couple of mini processors, a cluster of data entry stations, a tape drive, and communications channels.

- Add-on main memory systems will be aimed at users of 360/65 and larger computers. Marketed by a separate Cogar division, these 262K-byte, semiconductor modules are plug-compatible and identical in performance, says Cogar, to IBM 2365 units, but prices are 20% or so less.

These new products aren't just New Year's Resolutions, incidentally; Cogar promises 30-day delivery, pretty quick for a brand new product.

Cogar traces its lineage back to IBM's semiconductor components operations as well as to the key-to-tape pioneer, MDS. And, it is now delving into two distinct markets: IBM 360/65-compatible add-on memories, and remote and keypunch-room data entry. As we pointed out earlier in this issue, the key-processing market will peak out in several years. However, Cogar's new input unit seems to have features which could capitalize on the eventual switch to remote direct input. This, at least, appears to be part of the company's planning. Users can install the stand-alone station at remote sites as well as in the keypunch room. And by adding memory and peripherals, they can even do computing at the input site . . . thus moving into the realm of distributed computing.

The add-on memory market is definitely there, but it is limited by the 360's life-span (so far as current products are concerned) and by the reluctance of users to plug independent memory systems into their IBM computers. Independents will have to "educate" some users to the idea before they get much business -- just as did the tape and disk drive suppliers. EDP/IR estimates that over three quarters of 360/65 machines -- Cogar's major target -- have less than the maximum 1M bytes

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of main memory. Indeed, about 30% are at the minimum level for this high-ticket item (IBM charges $386,000 for a 262K module).

Money, marketing, and maintenance

Just having the right product is not nearly enough to succeed in the computer field, as every EDP company treasurer should know. Any company that wants to sell directly to end users needs a strong sales and service effort, and enough money to see it through the first uncertain months . . . or years.

Cogar appears to have plenty of the second. The Singer Company handed over $6.5 million (EDP/IR Dec.31,1970) in exchange for convertible notes, and an unnamed institutional investor has committed itself to buy 120,000 shares of stock for another $6 million.

But so far as marketing and support are concerned, Cogar is plunging into new territory. In the past it has stuck to OEM customers. Now it must show that its ad-campaign, its expanded 30-odd man sales force, and its growing field engineering team can successfully attract and care for end user customers.

INDEPENDENT DISK AND TAPE SHAKE-UP CONTINUES

The independent disk and tape drive market is moving through another phase in its shake-up as Potter, Telex, CalComp and others cut prices in reaction to IBM's aggressive price and product actions of the last few months (EDP/IR Dec.21, 1970). These cuts once again give the independents a discount off IBM rentals, but they don't restore the status quo. Users will now save only about 10% by going independent instead of the 20% they used to save.

The memory equipment sector had another rattle with ITEL Corp's agreement in principle to acquire Information Storage Systems, Telex's OEM disk drive supplier. If the deal goes through, ITEL -- which leases 360s and has begun selling some of its own peripherals -- may get marketing control of future ISS disk systems, which could include a 3330-compatible unit.

These changes raise important questions about the short- and long-run future for IBM-compatible disk and tape suppliers. At this point in time, the growth rate of the independents' business and even the viability of some drive companies are matters for speculation. The answers lie with the large users who are the independents' best customers, and, of course, with IBM itself.

Even suppliers in other peripherals areas should be watching very closely to see what happens when IBM feels threatened in one of its most important markets.

What will users do?

There will be two clear effects of the independents' price cuts. First, profit margins on memory equipment will be decreased both for the independents and for IBM. It's not likely that total demand for memory equipment will get enough of a boost from the new pricing to compensate for lower markups. It's thought that the plug-to-plug memory market has been particularly lucrative, so the cut in margins might bring profits down to a more "normal" level.

Secondly, the independents will lose some potential, if not actual, business. Again, the growth in independent disk system deliveries has been rapid, so a damp-

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ening of business could merely cause growth rates to be more in line with those in the rest of the U.S. hardware market. In the last year, a lot of big users have been educated to the idea of using independent peripherals . . . as time goes on, the independents will need less of a cost savings to "sell" their equipment. But the fact remains, some users who for a 20% savings could be persuaded to order independent gear -- and even to tolerate occasional squabbles between IBM and independent support people -- may not be persuaded for a 10% savings.

Several independents announced price cuts last week, and those who didn't are planning to. CalComp trotted out a new product announcement as well, for a "high density" 2314/2319-type disk system. The new disk is not quite so dramatic as it might at first seem. Although the spindles hold twice as much data as a regular 2314 drive, total storage of a full configuration is the same as for a 2314 eight-spindle system because CalComp's new controller can handle a maximum of four drives. CalComp says prices will be very good on this product -- and, since it requires half as many drives, this is a real possibility -- but it hasn't released prices.

ITEL plans ISS merger

ITEL, a concern with $200 million in 360 systems out on lease, is looking around for more products and services as computer leasing becomes less and less attractive. Last year it bought a peripherals manufacturer, Intercontinental Systems, and now it wants to acquire Information Storage Systems for $40 million worth of stock. (The plan will come up for approval by shareholders and directors of both companies this quarter.)

ISS has a contract (which still has more than three years to run) to supply disk files to Telex for end-user marketing, according to an ISS spokesman. But ITEL is no doubt planning for the future by buying one of the leading sources of independent memory equipment technology. The leasing company also has a majority-owned affiliate, Diablo Systems, which makes disks for minicomputers.

Conclusions

Most of the clamor about memory pricing revolves around 360-compatible disk and tape systems. But this rich base will gradually give way to 370 peripherals. No matter how well the independents may do in the next year or so delivering to 360 users, they are faced with the headache of competing with announced 370 products -- the 3330 and the 2319 (plus Integrated File Adapter) disks -- and with IBM disk and tape systems yet to be made public.

The very structure of the IBM-compatible disk and tape drive market isn't yet determined. ITEL could enter as a major new marketing force, for example, and of course Telex's long-run relationship with ISS can only be guessed. Further, if the independents can meet the technical challenges of System/370 peripherals, there is still the overriding question as to where the IBM price ceiling will stabilize and which competitors will find it worthwhile to stick around in the new market.

YEAREND ROUNDUP OF EUROPEAN COMPUTER ACTIVITY

In the yearend issue of EDP Europa Report, EDP/IR's sister publication, there is a full rundown on activity in the European computer marketplace. EDP/ER leads off with the thought that while 1970 was a good year for Europe, 1971 could bring a business slowdown in some nations. "The computer industry had better be prepared," EDP/ER says.

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The effects of the American recession had not really started to be felt in Europe until the end of the third quarter of 1970, and this is reflected in the activity of the computer industry during the twelve months ending June 30, 1970. The European manufacturers, freer perhaps than their U.S. rivals of financial worry during this period, performed exceptionally well

-- our figures show an increase of 16.8% in the total number of machines installed (from 6,759 to 7,894) and an increase of 95.62% in the backlog held by these companies (from 709 to 1,387) systems, which exclude the 2,000 D5 mini's on SAAB's order book.

On the other hand, the report estimates that major European mainframe makers are falling some 10% to 20% behind expectations although, just as in the U.S., "the smaller companies, terminal and peripheral makers' business appears to have suffered less."

Following the merger of the Honeywell and GE computer interests ("the most significant event for European computing in 1970"), there are only four major "pure" European computer companies left. Here are a few highlights from the year-end issue:

- A natural speculation was confirmed in mid-December when Siemens announced that its new range of machines was to be based on the RCA 2, 3, 6 and 7. In the year 1969-1970, the German manufacturer's computer business increased by 35% to $192 million, and for the year now in progress sales of $233 million is forecast.

- ICL remains the leading European manufacturer with some 41% of the U.K. market. Although "it is unique in that it has announced no new models" during the last year, ICL's sales of IBM-compatible computers have doubled in the past two years. Also, ICL's deal with Consolidated Computer Ltd. (see story, page 1) for data capture equipment places it in "a small band of mainframe suppliers . . . able to offer such facilities as part of a standard deal".

- Of the purely European companies CII, the national company of France, is in the most precarious position, EDP/ER reports. "Of its new range of machines it has only sold some 60 to 70 and it is well behind on deliveries and expectations." Government markets seem to be CII's main hope, says EDP/ER, and ". . . the latest of these is its likely adoption by the French national telephone service as the prime source of electronic telephone exchanges."

- During 1970, Phillips spent about $36 million on its computer department. It could well be, the newsletter says, that Phillips has now abandoned any plans to seriously enter the mainframe rat race, but this is not being suggested. Indeed, a bright future on the computer periphery is seen: "With Phillips' experience in accounting machines and calculators, and with its unrivalled knowledge of mass production of quality electronics, Phillips could become a European Viatron with a difference, it could work and be profitable."

The full newsletter contains many more details, plus a census of European computers. A sample issue is available from EDP/IR in Newtonville, Mass. Please call for information, or to order, send in the enclosed subscription card.

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E|D|P industry report

• THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" JANUARY 29,1971 • VOL.6,NO.7 P.J.McGOVERN,EDITOR

Marketing becomes important

AS SYSTEM/360 STARTS LOOKING OLD AND USERS CONSIDER CHANGE, LEASING COMPANIES LOOK FOR WAYS TO INCREASE ITS STAYING POWER

With deliveries of System/370 computers about to begin, the third-party leasing companies today are at a major crossroad in their business history. The System/360 equipment they supply at reduced prices has not yet paid for itself; but initial lease terms are running out, and additional inducement may be required to prevent customers from returning equipment and opting for newer computers.

Third-party leasing companies, as a result, are being forced to decide whether they are simply financial opportunists, or whether they want to remain a force in the computer industry.

They certainly are a major factor at present. The $2.8 billion worth of computers owned by third-party leasing companies represents about 12% of the domestic installed base, by value. This equipment, manufactured by IBM and purchased during the late 1960s by leasing companies, is worth more than the entire installed base built by any of the other mainframe manufacturers. It's now three years old, on average, and could become the basis for a realistic used computer market.

In any event, action is clearly called for. And during the past few weeks, announcements of some first moves have begun to come in:

- Itel Corp.'s computer leasing division has signed a major agreement with Advanced Memory Systems so that it can supply semi-conductor add-on memories for its users of 360/30s, 360/40s, and 360/50s. The contract -- for a minimum of $3.75 million immediately -- could increase to $12 million or more by mid-1973. In addition, Itel has agreed to acquire ISS, the peripheral manufacturer.

- The Computer Lessors Association -- on behalf of its ten member companies -- has retained Compata, Inc., a West Coast consulting firm, "to investigate possible system enhancements to various models of the IBM 360 product line owned by members of the association."

- Comma Corp. -- an independent computer maintenance company -- has signed maintenance agreements with four major third-party leasing companies, and also will provide reconditioning and reconfiguration services for these companies. (See story, page 5.)

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These moves are indicative of the ingenuity that third-party leasing companies will need if they are to play an active role in the computer industry of the 1970s. The International Data Corporation, publisher of EDP Industry Report, has measured user reaction to new computers and talked to third-party leasing customers about their plans as part of its corporate planning service for mainframe, peripheral and leasing companies. This article gives an overview of the leasing industry, a summary of customer attitudes, and an analysis of factors that will affect the participants in this industry.

A bold gamble

For years, many types of capital equipment such as machine tools and aircraft have been purchased by third parties and profitably leased back to users. So, as the computer industry began to burgeon during the later 1960s, some of the traditional leasing companies and some newcomers decided to go boldly after new business in the glamorous new computer industry.

The technique was simple . . . arrange a financial commitment that looked to the user like a better price. He often didn't have to agree to keep the computer any longer than he would have normally. The user selected the computer he wanted, decided on the exact configuration, then let the lessor purchase the computer. The third party, by depreciating the equipment over a longer period than the five or so years used by mainframe manufacturers, could offer users a 15% to 20% discount from IBM rentals yet theoretically operate at a profit by keeping the systems in the field for eight to ten years.

Third-party leasing companies offered three types of leases, with discounts varying according to the risk or the need for business:

+ Short-term leases for less than three years;
+ Intermediate leases with three-to-six year terms;
+ Full payout or risk-free, "non-operating" leases.

The first two types -- the "operating" leases -- comprise the bulk of third-party leases and constitute varying amounts of risk for the lessor: With an operating lease, the user has the option of sending the equipment back before the lessor has recovered his investment.

. . . with initial success

Although a certain amount of second-generation and non-IBM equipment went on third-party lease during the mid-1960s, it wasn't until 1967 and the large-scale deliveries of IBM System/360 computers that the effect of this potential force began to be felt. And in 1968, lessors purchased almost half the equipment they now own . . . much to the chagrin (and excessive profit) of IBM. By 1970, this activity had dropped off and a dozen companies -- each with over $100 million of computers installed -- dominated the third-party leasing industry. Here's how this business looked at yearend 1970:

- In the U.S., leasing companies currently hold about $2.8 billion worth of computer equipment, or nearly 12% of the total installed value of systems in this country. About 90% of this equipment consists of different models of System/360, another 5% is composed of other third-generation computers, and about 5% is older computer equipment.

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INSTALLED BASE OF PURCHASED COMPUTERS IN THE U.S.
(Values in $ Billions at New Purchase Price, Yearend)

Year	Total Installed Base	User-Owned Base	Third Party Leased Base	Percent of Total on Third Party Lease
1965	$ 7.7	$3.0	$0.15	2%
1966	10.0	3.6	0.33	3
1967	13.6	4.1	0.82	6
1968	$17.4	$5.0	$2.1	12%
1969	21.2	6.0	2.7	13
1970	23.0	6.3	2.8	12

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- Currently, twelve major leasing companies, each with over $100 million installed, hold about 90% of the third-party base. These, together with lots of small, regional companies and a few lessors with $20 million to $60 million on lease, account for about 20% of the total value of System/360s in the United States.

- Less than 10% of the equipment on third-party lease is of the non-IBM variety. The $250 million in this category is composed primarily of Univac 1108s, Burroughs 300s and 500s, and GE 400s and 600s.

- As a corollary to the above, only IBM has been seriously impacted by third-party leasing. If the $2.5 billion of System/360 equipment now held by leasing companies were on IBM's books as rental gear, IBM's total U.S. rental revenue from System/360 would be running about 30% above current levels.

. . . but a mixed outlook

For perhaps the first time in their short computer industry careers, third party leasing companies have a lot of industry marketing to do. The initial placement of all this equipment often pivoted around the financial arrangement; keeping it out on rent until it is profitable, however, means selling third-generation equipment against the newer models . . . selling System/360 against System/370.

And a lot of this is involved. During 1970, about $900 million worth of third-party equipment came up for renewal, and about one-third of the users opted not to renew their leases. Of those that did, about 80% selected a short-term renewal, often on a month-to-month basis, and therefore must continually be catered to by the lessors. During the next three years, even more equipment will be scheduled for renewal:

Year	Equipment up for Renewal (At Original Price)
1971	$1.5 billion
1972	2.0 billion
1973	2.2 billion

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IBM THIRD-GENERATION EQUIPMENT OWNED BY LEASING COMPANIES
(Values in $ Millions based on Purchase Price)

System Model	Number Units	Value	% by Value
360/20 & 25	535	$ 90	3%
360/30	1765	865	34
360/40	610	550	22
360/50	325	480	19
360/65	150	410	16
Other	315	135	6
TOTALS	3700	$2530	100%

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The large value of systems coming off lease in 1971 reflects the many three-to-four-year contracts negotiated during 1967 and 1968. In estimating the value of equipment renewable in 1972 and thereafter, IDC assumed that a large share of users in the future will continue to select short-term commitments rather than signing up for another two-to-four years. This is what happened last year, and if the trend continues, virtually all of this equipment will be on short-term contract by 1974 or 1975.

The prime question, then, is whether third-party leasing companies can in effect establish a "used computer rental market" that will absorb -- at reasonable rates -- $1 billion to $2 billion of the System/360 equipment tabulated above. In a very true sense, this is the question being asked by the lessors themselves through their contract with Compata. And Itel is banking on the fact that all many users seem to want is more memory capacity.

The view of the user

There is no question but that leasing company success during the next few years will depend on the user's attitude, and this will be strongly influenced by IBM salesmen trying to make their quotas with System/370 computers. At present, however, a sizable portion of users seem receptive to remaining with System/360 equipment for some time. In an attempt to forecast user action during the next few years, IDC has conducted several surveys. Here are some summary results:

- Among third-party customers, 42% said they had little interest in System/370 during the next two-to-three years. An additional 14% said that they expected to add 370s, but had plans to keep their leased 360s for the time in question.

- Among users with purchased systems, only 24% indicated interest in switching to the 370. Three-fourths of them, therefore, are potential candidates for additional 360s from third-party companies.

- Among users currently renting from IBM, just over half are interested in a System/370 in the next few years. These, however, will probably stay with IBM as their supplier.

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The leasing outlook

Many of the users contacted in these surveys report that they plan to bargain for larger discounts when their contracts expire, or that they would consider adding a third-party 360 if the price were right. Indeed, price erosion has started. Late in 1970, a 360/30 or 360/40 system with peripherals was usually priced at about 70% of list price. Just this month, however, users are beginning to report deals from leasing companies in the 50% to 60% range.

Such prices may be justifiable by a leasing company, since the equipment is partially depreciated and is more valuable producing some rent than sitting in a warehouse. On the other hand, the companies originally priced their systems to pay out in eight or ten years, and any price reduction means a longer payout period. Also price reductions may not be the entire answer.

Actually, the third-party leasing companies are entering a period in which marketing -- not simply financial wheeling and dealing -- is becoming key. They are competing directly with mainframe companies, an arena in which service and systems understanding is as important as pure price.

LEASING -- ANOTHER MARKET FOR THIRD-PARTY MAINTENANCE

Comma Corp. recently talked four leasing companies into allowing their customers to buy its maintenance services, allowing leasing users a price break of about 10% off IBM's maintenance charges. This deal is good news for Comma, a company formed by ex-IBM field engineers; it could mean several $Million more a year in sales.

Third-party maintenance itself is a very new field, and Comma's contract is an eye-opener. Competing with IBM in the maintenance area is still an unproven business, and most of the leading third-party maintenance groups are steering clear of the mainframe systems market anyway. They cater instead to independent peripherals manufacturers, minicomputer makers, and systems houses and write contracts mostly with the hardware supplier, not the end-user.

At the moment, the total amount of third-party maintenance is miniscule . . . perhaps a few million dollars. But there's considerably more than there was a year ago. During 1970, maintenance services became a definite market. Big names like RCA and Honeywell Information Systems stepped up their efforts, and non-computer electronics service organizations like Syntonic Technology have begun to advertise. Two companies founded during the last year-and-a-half for the sole purpose of getting into the maintenance business -- Comma and SirVess, Inc. -- signed a number of contracts. Then, last October, Leasco added third-party maintenance to its menu. And Management Assistance Inc. (MAI) incorporated its 1000-man maintenance arm as Sorbus Inc. and set it to passing out promotional literature at Fall Joint.

There are several reasons for this timing. First, there's unbundling, which has encouraged general independence from IBM in both hardware and services. Then, independent peripherals -- especially terminals -- are flourshing, as are mini-based systems. These markets have many suppliers whose customer bases aren't large enough to justify inexpensive service. Finally, some companies with basic service orientation simply see maintenance as a natural diversification.

On the next page, we have listed some third-party maintenance suppliers in terms of their major activities. These classify roughly into user contracts

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THIRD-PARTY MAINTENANCE SUPPLIERS

Company	User-oriented Maintenance	Manufacturer-oriented
RCA Service Company	Terminal systems, operation & maintenance for Fed. Govt., systems maint. for users.	Contracts with mini-computer suppliers.
Comma Corporation	IBM and mixed systems for large users; will maintain systems for leasing company customers.	Ten contracts to date with manufacturers of IBM-compat. memories and other peripherals.
SirVess, Inc.		Ten contracts to date with vendors of mini-based systems and other peripherals.
Honeywell Information Systems		About twenty contracts with makers of CRTs and other peripherals.

Other companies providing maintenance for users and manufacturers include Leasco (Teletypes), Control Data (minicomputers), Syntonic Technology (terminals and mini-based systems), Raytheon (CRTs) and MAI's Sorbus Inc.

(mainframe installations and terminal networks) and manufacturer contracts (peripherals and minicomputer systems). These two very different revenue sources are explored below. The independent maintenance suppliers also offer related services, or plan to later on. Comma, for example, reconfigures mainframe systems at three centers, RCA Service is into facilities management and systems engineering, and Leasco's field engineering arm does communications network consulting.

Competing with IBM

Comma Corp.'s agreements with DPF&G Computer, Diebold Computer Leasing, Randolph Computer, and Talcott Computer Leasing authorize Comma to write maintenance contracts with the leasing companies' computer customers. Comma says the market thus opened to it is worth over $15 million a year. That's an upper boundary, of course, not a sales forecast. And it remains to be seen whether other leasing companies will go this route. Leasco, for one, is thinking of doing its own maintenance for System/360 customers beginning in 1972.

Third-party maintenance has a couple of selling points with users. Price is one. Flexibility is another. The independent service people will contract for maintenance at a mixed site (one including independent peripherals or non-IBM mainframes), and this type of installation is becoming more and more common.

And third parties have advantages when competing directly with IBM products, or services. For one thing, there is a lot of IBM equipment around -- the third-party leased and purchased computers (page 3) -- on which users already pay separately for maintenance. Leasing companies own about 17% of IBM's U.S. base, users another 24%. If independent service companies could sell even a small fraction of the maintenance on this equipment, they would be doing well.

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But there are also certain limits. For one thing, not all IBM models are worth an independent's while to maintain; the most profitable bets are 360/40s and up. So far as System/370 is concerned . . . the independents aren't likely to start servicing the new IBM family until it has been out in the field for several years. By that time, some of the bugs will be ironed out and there will be a good supply of IBM field engineers trained on the 370 and possibly tired of belonging to the IBM family. IBM's monthly maintenance charges for System/370 will be higher than for the 360, but at the same time, system up-time will be much better. There will be automatic procedures to diagnose faults and to keep the system running despite them.

Of course, IBM could cut maintenance prices, but this isn't likely; IBM already takes one of the lowest percentage markups for maintenance of its products and services. Also, there are more tangible problems. One is keeping a stock of IBM spare parts. Another is continually updating the skills of the maintenance force as changes are made in IBM systems. These problems may be solvable only in metropolitan areas where customers are highly concentrated.

There is another user-oriented maintenance market . . . that for terminal networks such as those used for reservations and commercial time sharing. As the table indicates, both RCA and Leasco have contracts in this area. RCA maintains airline reservation, press service, and travel reservation terminals, among others, and Leasco maintains Teletypes for universities and time-sharing companies as well as for its own time-sharing customers. Here again, there is a lot of product standardization and plenty of competent personnel.

Contracts with hardware suppliers

Most of the leading third-party maintenance suppliers have signed contracts with small suppliers of peripherals and minicomputer systems. The difference between this and total systems maintenance is that the independent servicer isn't competing with the equipment supplier, he's working through the vendor.

A small manufacturer may well prefer to save the overhead cost of setting up his own service network by buying a claim on the large existing networks of other computer industry companies. After all, he may get immediate access to RCA Service's large number of field personnel, Honeywell Information Systems' huge maintenance force, Comma's 110 or so people (not counting reconfiguration) and so on.

Service training on various peripheral devices and minicomputer systems is not difficult for experienced field engineers. IBM compatible devices are, of course, similar to IBM products, and in some cases the maintenance company takes on field engineers from its customer as well as working closely with the hardware vendor. (Even in such cases, however, the maintenance supplier usually wants some minimum guarantee before he will negotiate a contract.)

Most of the firms that contract for third-party maintenance are relatively obscure, but a few have familiar names -- Compat, Computer Automation, Hazeltine, Data 100, Colorado Instruments, Sycor, Viatron, and others. Some of the maintenance suppliers they use are described in the table.

CRTs, memories, and other peripherals

The fortunes of independent maintenance crews hinge partly on the growth of independently supplied peripherals or, more specifically, on growth of peripherals

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from small independents. A good example is CRT displays. There are a number of CRT models being serviced by third-party FEs. The independent CRT market is growing at about 30-35% a year, but it is becoming more and more dominated by the big suppliers who don't need outside maintenance. The whole point of third-part maintenance, of course, is to make the small suppliers more competitive and more able to share in the growth of terminal-oriented systems.

Independent peripherals as a whole are soaking up an ever larger part of the user's dollar. They accounted for 3% of U.S. hardware shipments in 1970. But again, most of the money goes to big suppliers like Potter, Telex, and MAI who are more than happy to do their own maintenance. Cheaper and better-available maintenance is only one of the things small hardware suppliers must offer in order to gain or even hold their own with the big wheels of the peripherals industry.

Mini maintenance

Minicomputer sales have zoomed in the last few years. This appears to be a likely territory for third-party maintenance because, from the end-user's point of view, there are a lot of little suppliers of systems containing minicomputers. Even though a handful of manufacturers sell most of the minicomputers, there still are many more small producers than there are in the "big" computer market. More important, a large proportion of minis are sold OEM to be part of systems which involve hardware not supplied by the CPU maker. The systems house that includes minis as a part of its system is a good prospect for third-party maintenance, and the mini manufacturer with a high proportion of OEM sales may want an outside service force to take care of its few end-user customers.

What are the risks? Just that the minicomputer or systems house customer may never ship enough units to amount to a hill of maintenance dollars. Or he may quietly vanish altogether, with or without ever delivering a computer. The maintenance suppliers try to avoid real fly-by-nighters, but the fact remains that the minicomputer industry is highly competitive and some small firms get squeezed out.

Prognosis

Third party maintenance is in its infancy. As with all infants, it's noisy for its size. Some of the competing companies only came on the scene in 1969 and 1970, and some are just beginning to chalk up contracts. Unbundling and growth of independent peripherals and minicomputers have stimulated interest in this market from those who want to make money as a new company or who want to capitalize on an existing reputation and/or maintenance force.

The field is wide open to competition from several directions. The current roster of entries indicates that mainframe manufacturers, leasing companies, IBM spinoffs, and electronics maintenance organizations can all get into the act. And if the pickings look good, other sectors of the computer industry such as peripherals or minicomputer vendors are sure to want in, too.

STOCK TABLE

EDP Industry Report will no longer publish a stock table in every issue, because readers indicate they usually rely on regular financial publications for this information. EDP/IR's related publication, COMPUTERWORLD, provides weekly tables and charts covering 140 stocks. Write CW Circulation, 60 Austin St., Newtonville.

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EDP industry report

• THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" FEBRUARY 22, 1971 • VOL.6,NO.8 P.J.McGOVERN,EDITOR

GOVERNMENT MARKET OFFERS MIXED BAG TO COMPUTER INDUSTRY: NEW PROGRAMS COULD SPUR ACTIVITY AS TRADITIONAL SPENDERS RETRENCH

Computer expenditures aren't all well defined in the bulky Federal Budget for fiscal 72, but hidden away here and there are specifics of a few new buys and proposals for new projects that probably will bring business to U.S. computer manufacturers. Despite President Nixon's "expansionary budget," however, no big carrot is held out to the industry.

Always, of course, computer industry participants have had to look beyond details in the Federal Budget to calculate the effect of Government spending on orders and shipments. And with the bulk of computer-related revenue coming from the private sector and from abroad, the most important thing about the FY 72 Budget is what it does for business in general. If the economy is good, the computer industry should prosper, poised as it is on the verge of another round of new produce line deliveries.

For years, of course, the Government has been atypical of other computer users, buying computers rather than renting them. In FY 70 (latest figures available) it owned about 64% of its 5277 computers. Estimates by International Data Corporation, publisher of EDP Industry Report, are that the Government had some $2.35 billion worth of computers installed at yearend 1970, but still paid more than $420 million, or 11% of the total U.S. rental to computer manufacturers.

This direct Government spending, however, is increasing more slowly than that of other computer users, so it isn't going to do much pump priming for a renewed surge in industry revenues. There are, however, some specific areas where new programs could come to the aid of the computer manufacturer that gets the business:

- The Department of Defense, NASA, and the Atomic Energy Commission are the big Government users, with 88% (by number) of all computers in the Fiscal 70 Inventory. For Fiscal 72, however, only $40 million or so of new procurements has been specifically mentioned by DOD.

- Within all other Government areas -- where only 12% of the total number of computers are used -- there are quite a few programs that hint of potential increased computer utilization.

In general, the major R&D and procurement projects -- pockets from which a lot of computer spending comes -- will remain fairly static. There will be isolated bright spots, but as one official told EDP/IR: "There is little in the Budget for computer companies to be enthused about."

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Absolute budget levels aren't the only measure of key new procurements, however. During the current fiscal year, for example, independent disk and tape drive suppliers landed contracts that were designed to save EDP dollars (EDP/IR Dec.9,1970). And other equipment substitutions during Fiscal 72 -- for both peripherals and for mainframes -- are scheduled to do the same.

Control Data, Univac, RCA, XDS, and Systems Engineering Labs, for example, have a significant share of their computers owned or leased by Uncle Sam, and they will certainly be trying to cash in on at least one of the few new procurements planned for the coming fiscal year. But they will probably have to look elsewhere for business. Both superscale and small control computers will continue to feel the budget pinch as a couple of their biggest Government fans -- NASA and the AEC -- get their allowances cut.

For those manufacturers that can cater to more businesslike applications, however, there is a way to garner some public dollars. State and local governments are growing like crazy in their use of computers . . . setting up law enforcement information systems, for example. The table below illustrates the relative importance of Federal and state/local business. In a recent survey, IDC found computer use in this area to be growing at a very substantial rate.

SHARE OF GOVERNMENT COMPUTERS IN U.S. BASE
(As of Dec. 1970 -- General Purpose Computers Only)

Company	Number Installed in the U.S.		% of Manufacturer's Base, by Number	
	Federal Gov't	State & Local	Federal Gov't	State & Local
IBM	1610	1545	4.8%	4.6%
HIS	317	121	8.9	3.4
Univac	916	227	19.8	4.9
NCR	193	203	5.2	5.5
Burroughs	167	87	9.8	5.1
RCA	205	118	19.1	11.0
CDC	166	7	31.3	1.3

Moderate rise in defense spending

For the Department of Defense, the planned budget outlays will be up some 7.5% over Fiscal 71's estimated spending. These summary figures for the entire department, however, spread a cloak of mystery over actual plans for spending in the computer area. There are several reasons for this. First and foremost, computer appropriations aren't singled out in general. So with the exception of a few significant projects, actual spending plans for computer hardware, software, and services can only be guesstimated from the nature of each agency's planned spending programs and from the general tenor of its overall budget.

On top of this, the Senate and the House actually make the appropriations, and they undoubtedly will slash and pad to their hearts' content. And with a President from the minority party, Congress is likely to be less cooperative than usual. Cautions similar to this must be kept in mind in reading many portions of the Budget. With these warnings in mind, EDP/IR presents the following highlights.

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- The Defense Department budget has two areas involving EDP spending -- Operation & Maintenance (including Intelligence and Communications) and procurement of electronics and communications equipment -- that will run into spending cuts for FY 1972. A third -- Research, Development, Test & Evaluation -- is on the rise both in actual spending and in appropriations requests.

- Funds have been budgeted for several DOD computer procurements. The Phase II project will get $24 million in Fiscal 72 for purchase, rentals, and services of Burroughs computers. (The Air Force awarded Burroughs the $61M contract in 1967 -- see EDP/IR Dec.29,1967.) Wimmix (World Wide Military Command and Control System) has been funded at a total of $15.5M for Fiscal 72 and the Air Force's Advanced Logistics System (ALS) at a piddling $1.5M.

Wimmix started in 1969 as a giant DOD buy of up to 87 computers worth several hundred megabucks. But by the time the Request for Proposals hit the streets in October of last year, the proposed contract had been whittled to a maximum of 35 computers. The ALS (which once was being thought about as a $250M project) has not yet been put out for bids.

Although it's difficult to get specific figures on just what DOD will fork out for computers and computer-related equipment, sources in the Pentagon will say for the record that there is to be no burst of computer-buying activity in FY 72. There are unofficial indications that the amount of money funded for ADP buys in FY 72 may be a little higher than for the previous fiscal year.

For example, the Advanced Research Projects Agency (ARPA) was authorized $26.7 million of R&D funds for computer-oriented projects for the current fiscal year. Since Congress must still OK the outlay for Fiscal 72, officials at ARPA have been hesitant to disclose exactly how much they have asked for in the new budget. They would say only that it was "a little bit more than in FY 71."

(ARPA handles the Illiac IV computer development, which will have a total cost of about $27 million spread over a number of years. Only about $4M or so is funded each year for the project. ARPA also funds research projects at various universities; it will make money available, for example, to the University of Utah for a CRT display project involving three-dimensional surfaces. Among its major projects for FY 72: a speech understanding -- rather than recognition -- program; image digitizing; and specialized computer systems for symbolic processing.)

Computer companies directly affected by DOD buys are hesitant to comment on the 1972 budget, but one major manufacturer said it was in "good shape" because the weapons systems for which he is producing computers have been well funded. "All we need now," a spokesman said, "is congressional OK on the budget." He felt the commercial area, however, would see "cutthroat competition" because of the few dollars available to the many seeking contracts.

The National Aeronautics and Space Administration is one of the largest Government users of computers, but President Nixon has pared NASA's total budget by $217 million, or over 6%. The agency has shelved indefinitely any plans for astronaut expeditions to Mars and is slowing down its earth-to-orbit reusable space shuttle program. The Apollo program will be stretched out through mid-FY 73. However, NASA will launch in FY 72 an experimental satellite to demonstrate practical uses of satellites in management of natural resources.

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And the Atomic Energy Commission's "total program outlays" will be cut slightly in FY 72. Its space applications are especially hard hit -- down $38 million -- but it will go ahead with development of a new nuclear reactor and with continued construction of a proton accelerator. Also, the impact of budget trimming may not affect AEC computer buys as much as might be expected. One Washington spokesman points out that Congress has shown some tendancy to prefer spending money on supercomputers rather than on other AEC experimental equipment.

Now for the bright spots

The Department of Transportation will spend a great deal of money in computer related areas. The Federal Aviation Administration has programs underway to automate the enroute and terminal portions of the air traffic control system which will require budget authority of $146M in 1972. An additional $104 M is provided to procure other facilities and equipment, including electronic instrument landing systems. The appropriation request of $81 million for the airways research program includes $65 M for development of an air traffic control system. (This program ran into difficulties when Raytheon failed to develop a prototype display on schedule for the FAA.)

HEW's budget may provide some business for minicomputer manufacturers. The research budgets for its National Institutes of Health have an added $125 M in appropriations requests, some of which is likely to go for data acquisition and analysis systems.

The Treasury Department is moving ahead with its automation program, and is planning a big project that could include ten computers and 3600 CRTs to be acquired from Control Data by the end of Fiscal 72. According to the Budget, a $38 million increase in funds for revenue accounting and processing includes money for three existing and three new regional service centers.

The Commerce Department's new National Oceanographic and Atmospheric Administration (the Weather Bureau with a few frills) is asking for a net appropriations increase of $55 M for R&D, facilities, and weather satellite operations. The increases would, among other things, provide for better weather forecasting and launch of a new weather satellite series. The National Bureau of Standards, which carries on research on computers, has had an appropriations increase of $3.2 M, but little if any of that is slated for NBS's role in computer standards programs.

Basic research, in general, will get a considerable boost in FY 72. The National Science Foundation budget calls for $622 M in appropriations, up 23% from FY 71. In the educational-computing research area, NSF has budgeted $17.5 million -- or $2.5 million more than this year. This program is aimed at increasing the base of computer science knowledge to make possible innovative approaches to the use of computers in education and research, and help computer users evaluate the capabilities and limitations of computers so as to better utilize their potential. A significant part of this program in FY 72 will be devoted to the support of efforts to develop computer assisted instruction.

The environment is also a vital element in the Nixon budget, and the new Environmental Protection Agency has what it terms an "action" budget for nearly $2.5 billion -- much of it being poured into R&D. Undoubtedly, computers will play a large role in these activities, both for high-powered computer modeling and as data analysis and control elements in water and air monitoring systems. EPA, however, follows the same route as most agencies; as a hedge against what Congress finally authorizes, there is no specific line item labeled computers.

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DISTRIBUTION OF FEDERAL COMPUTERS BY AGENCY*
By Number -- as of June 30, 1970

Agency	Percent	Comment
AEC	14.3%	The AEC's phenomenal stock of computers -- including an extremely high proportion of DEC and other mini and control computers as well as many Control Data superdupers -- is concentrated at relatively few research and test sites. The AEC owns virtually all of its systems.
NASA	13.1	NASA's computers are even more concentrated than the AEC's. Like the AEC, it requires giant machines (with an emphasis on IBM and Univac as well as CDC) and dedicated application computers. Over half the machines shipped by XDS (SDS) to the Federal Government have gone to NASA. Like the AEC it owns over 90% (by number).
Air Force	22.9	The AF is more oriented toward medium-sized business computers, such as the Burroughs 3500, although it also has a number of large-scale systems. Along with the Army, it provides almost the entire Federal market for NCR, and it is by far the biggest Burroughs customer in the Federal Government. About half its systems are owned.
Army	17.6	Over a quarter of the Army's computers are installed overseas (including many NCR machines) as opposed to roughly 10% each for the AF and Navy. The Army uses practically nothing from Burroughs, but otherwise its inventory is distributed among manufacturers pretty much like that of the Air Force. About a third of its systems are owned.
Navy	16.9	The Navy has a lot of IBM and Univac machines. While it also has a fair number of CDC computers, these are the smaller, dedicated application systems. The Navy has purchased about 180 specially designed machines from Univac and other suppliers (about 20% of its total number). It owns a high fraction of its computers -- about two-thirds.
Defense Supply Agency	2.4	DSA, like most of the civilian agencies (except NASA and AEC), uses various sizes of business computers and only a few large-scale IBM and Univac machines. It owns half.
Other DOD	.8	The Defense Communications Agency and Defense Atomic Support Agency have the few remaining DOD computers.

SUMMARY OF ABOVE: Defense Department - 60.6%
NASA and AEC - 27.4

DOD, NASA, AND AEC - 88.0%

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DISTRIBUTION OF FEDERAL COMPUTERS BY AGENCY* (cont.)
(By Number -- as of June 30, 1970)

Agency	Percent	Comment
Transportation	2.2%	The Federal Aviation Administration is the biggest user by far in DOT. It has a number of IBM computers, largely owned, which it uses for air traffic control.
HEW	1.8	The Social Security Administration (which handles Medicare) uses a large block of IBM medium and large-scale machines, as well as some RCA Spectra's. HEW also has various systems, including laboratory-oriented computers, scattered among its medical research and other branches. HEW owns 56% of its computers.
Treasury	1.5	The IRS and other Treasury offices have a number of small-to-large scale computers from IBM and Honeywell. (Control Data last December won a large IRS contract -- EDP/IR, December 21, 1970). The Treasury owns 88% of its computers.
Commerce	1.4	The Census Bureau and the former Environmental Sciences Services Administration (including the weather bureau) have the bulk of DOC's computers. Their machines include, among others, a few large IBM, Univac, and CDC systems and a number of minis. (ESSA is now melded into the larger National Oceanic and Atmospheric Administration). DOC owns 73% of its computers.
Interior	.9	This agency uses mostly small and medium-sized computers.
Agriculture	.8	The small number of IBM and other computers are 67% owned.
VA	.8	VA has mostly IBM machines, including a few large-scale.
Other Civilian	2.6	Other civilian agencies with computers include the GSA (27), P.O. Dept. (17), Labor (10), and NSF (18). Also, some Justice Dept. money goes to the states and is spent on computers at that level. Similarly, NSF money goes indirectly into computers through NSF grants to university and other research centers. The new Environmental Protection Agency is not included in the FY 1970 inventory.

COMPUTERS USED BY FEDERAL GOVERNMENT: DOD, NASA, and AEC - 88.0%
All other agencies - 12.0
100.0%

* Data is based on the Inventory of Automatic Data Processing Equipment in the U.S. Government for FY 1970, published by the GSA's Federal Supply Service

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NEW HONEYWELL 6000 SERIES COMPETES WITH ANNOUNCED SYSTEM/370 MODELS

In "the third in a series of new product announcements since the merger last October" with GE's computer interests, Honeywell Information Systems last week announced the 6000 series of large-scale computers. Three scientific models -- the 6030, 6050, and 6070 -- are state-of-the-art versions of GE's 600 series and available for July delivery. Each has a business counterpart -- the 6040, 6060, and 6080 -- which will be shipped early in 1972 with an Extended Instruction Set (for about $900 per month extra) designed to provide "several times the processor speed for business-oriented applications." All models will use the now-proven and powerful GECOS operating system.

The new computers can be compared in price and performance to the three announced models of IBM's System/370:

Series 6000	Average rental	System/370	Average rental
6030/6040	$23,000	370/145	$22,500
6050/6060	47,000	370/155	48,000
6070/6080	68,000	370/165	90,000

Direct comparisons, of course, are not yet possible, but HIS has run simulations that indicate the performance of the computers is very comparable to the price. The 6040 is a little more powerful than the 370/145; the 6060, says HIS, is twice as powerful as the 6040 and roughly on par with the 370/155; and the 6080, which is 50% faster than the 6060, is no match for the 370/165 in a single processor configuration. (Rentals would be about 90% of those shown if the user opted for a five-year lease.)

The larger two models of the 6000 series, however, are available as multi-processor systems with up to four central processors that would cost appropriately more but would offer proportionately higher price/performance inherent to multi-processor systems. This is the approach being followed by most computer manufacturers, but IBM to date has not announced multi-processors or multi-programming for the 370/155 or 165.

Impact and implications

The new processors -- highly price/performance improved versions of the GE 600 line -- are extremely fast. Cycle time is 1.2 microseconds per 72 bits on the smaller four versions and 500 nanoseconds on the larger two, giving a maximum character cycle time of 42 nsec., comparable with the speed of IBM's latest machines.

Primarily, the 6000 series of computers appear to be HIS's protection of its GE 600 base. About 120 of these computers are installed worldwide and represent over $200 million in purchase value. In general, the 6000s probably won't be selected as upgrades by existing Honeywell Series 200 users, but could open new markets among IBM and Univac users, for example.

Honeywell will eventually introduce a new computer family -- not expected before early 1972, however -- that will provide price/performance of the 1970s for all its customer base. The line probably will involve microprogramming so that it provides a reasonable amount of compatibility with both the old GE 200/400/600 machines and Honeywell Series 200 computers. And, it could carry downward some of the characteristics of the new 6000 line . . . there are some lower numbers left!

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NEW REGISTRATIONS BY COMPUTER COMPANIES

[Listed below are brief descriptions of proposed security offerings, from firms in the data processing field, that are currently in registration with the Securities and Exchange Commission. The preliminary prospectus for any issue may be obtained from the underwriter.]

New stock offerings are starting to pepper the financial pages again, but computer company registrations are particularly slow to pick up. (We've cheated by including AT&T's debentures among our new registrations.)

AT&T	American Telephone and Telegraph Co., 195 Broadway, New York, N.Y. 10007, on January 20 filed $500 million of debentures. The proceeds, at terms to be set by amendment, will be used for advances to AT&T affiliates, stock purchases in these companies, communications network improvements, and other purposes. The underwriters will be headed by Blyth & Company, Inc., 14 Wall Street, New York, N.Y. 10005.
COMMERCIAL CREDIT COMPANY	Commercial Credit Company, 300 St. Paul Place, Baltimore, Md. 21202, Control Data's financial subsidiary, on January 26 filed for sale of $100M of notes due 1977. Proceeds will be added to working capital, to be used initially to pay back short-term borrowing. Underwriters will be headed by Kidder, Peabody & Company, Inc., 20 Exchange Place, and White, Weld & Company, 20 Broad Street, both of New York 10005.
SCANFORMS, INC.	Scanforms, Inc., 322 Howell Street., Bristol, Pennsylvania, which was organized in January 1969 to sell business forms and furnish computer services, on December 29 filed 100,000 common. The proceeds, at terms to be set by amendment ($7 per share maximum), will be used to pay off loans and for other corporate purposes. The underwriter will be Albert and Maguire Company, Inc., Roosevelt Mall, Philadelphia, Pennsylvania.
TELEFILE COMPUTER CORP.	Telefile Computer Corp., 2000 Commonwealth Avenue, Newton, Mass. 02166, which markets an on-line business computer system (the "DPE-411"), on January 18 filed for sale of $2.5M of convertible subordinate debentures. The proceeds will be used for production and marketing of its computer telecommunication products and computer file controllers and of its DPE-411, to acquire hardware for the DPE-411 in Newton, and for general corporate purposes. The underwriter is S. D. Fuller & Company, Inc., 26 Broadway, New York 10004.
URBAN COMPUTER SYSTEMS, INC.	Urban Computer Systems, Inc., 170 Concord Road, Chelmsford, Mass. 01824, which is developing "computer-controlled data processing machines," on January 15 filed 130,000 common. The proceeds, at $5 per share, will be used for manufacturing of the company's Model 70 computer systems and for general corporate purposes. The underwriter will be Interstate Equity Corp., 44 Beaver St., New York, N. Y. 10004.

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AS OF JANUARY 1, 1971

NAME OF MANUFACTURER	COMPUTER MODEL	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS IN U.S.	NUMBER OF INSTALLATIONS OUTSIDE U.S.	TOTAL NUMBER OF INSTALLATIONS	TOTAL NUMBER UNFILLED ORDERS
IBM	System-3/6	$ 1,015	12/70	5	0	5	700
	System-3/10	$ 1,400	1/70	1570	80	1650	6700
	360/20	$ 4,200	12/65	8450	4870	13,320	900
	360/25	$ 8,000	10/68	2040	740	2780	640
	360/30	$ 12,300	6/65	7270	3200	10,470	200
	360/40	$ 22,000	5/65	3580	1880	5460	330
	370/145	$ 22,500	8/71	-	-	-	930
	360/44	$ 13,800	7/66	140	100	240	15
	360/50	$ 36,500	8/65	1420	605	2025	120
	370/155	$ 48,000	2/71	-	-	-	750
	360/65	$ 69,000	11/65	660	205	865	60
	370/165	$ 90,000	4/71	-	-	-	285
	360/67	$138,000	6/66	58	8	66	5
	360/75	$ 84,400	1/66	53	22	75	5
	360/85	$155,000	10/69	13	3	16	6
	360/9X	$150,000	11/67	13	7	20	X
	360/195	$232,000	3/71	-	-	-	16
	1130	$ 2,100	2/66	3350	1550	4900	120
	305	$ 3,600	12/57	2	22	24	X
	650	$ 4,800	12/54	8	36	44	X
	1401	$ 6,200	9/60	1810	1830	3640	X
	1401-G	$ 2,300	5/64	270	70	340	X
	1401-H	$ 1,300	6/67	80	20	100	X
	1410	$ 17,000	11/61	180	115	295	X
	1440	$ 4,100	4/63	615	500	1115	X
	1460	$ 9,800	10/63	130	60	190	X
	1620	$ 4,000	9/60	440	260	700	X
	7010	$ 26,000	10/63	39	12	51	X
	7030	$160,000	5/61	6	2	8	X
	704	$ 32,000	12/55	6	4	10	X
	7040	$ 25,000	6/63	32	27	59	X
	7044	$ 36,500	6/63	30	21	51	X
	705	$ 38,000	1/56	19	10	29	X
	7070/74	$ 27,000	3/60-2/61	176	57	233	X
	7080	$ 60,000	8/61	72	1	73	X
	7090	$ 63,500	6/60	28	27	55	X
	7094	$ 73,400	9/62	92	10	102	X
	7094-II	$ 79,400	4/64	24	0	24	X
	Subtotal			32,681	16,354	49,035	11,782
NCR	Century-50	$ 1,650	2/71	-	-	-	NA
	Century-100	$ 2,600	9/68	1250	325	1,575	350
	Century-200	$ 7,700	6/69	400	100	500	250
	Century-300	$ 20,000	2/72	-	-	-	25
	304	$ 10,000	1/60	17	2	19	X
	310	$ 1,000	5/61	17	3	20	X
	315	$ 7,000	5/62	437	318	755	X
	315-RMC	$ 9,000	9/65	125	50	175	17
	390	$ 800	5/61	350	500	850	X
	500	$ 1,000	10/65	1100	1550	2650	130
	Subtotal			3696	2848	6544	772
Philco	1000	$ 7,000	6/63	13	1	14	X
	210/211	$ 40,000	10/58	12	1	13	X
	212	$ 52,000	1/63	12	1	13	X
	Subtotal			37	3	40	
RCA	2	$ 14,600	7/71	-	-	-	33
	3	$ 19,600	10/71	-	-	-	26
	6	$ 29,900	10/71	-	-	-	17
	7	$ 40,100	10/71	-	-	-	14
	Spectra 70/15	$ 5,100	9/65	45	160	205	X
	Spectra 70/25	$ 7,900	9/65	15	73	88	X
	Spectra 70/35	$ 13,600	1/67	155	240	395	38
	Spectra 70/45	$ 23,100	11/65	310	210	520	44
	Spectra 70/46	$ 40,200	11/68	35	3	38	13
	Spectra 70/55	$ 41,600	11/66	20	17	37	6
	Spectra 70/60	$ 43,100	9/70	6	1	7	9
	Spectra 70/61	$ 55,000	3/71	-	-	-	5
	301	$ 9,500	2/61	340	23	363	X
	3301	$ 25,000	7/64	70	1	71	X
	501	$ 17,000	6/59	70	4	74	X
	601	$ 50,000	11/62	5	0	5	X
	Subtotal			1071	732	1803	205
Standard Computer Corp.	IC-4000	$ 9,000	9/68	16	0	16	X
	IC-6000	$ 16,000	5/67	9	0	9	X
	IC-7000	$ 17,000	6/69	16	0	16	3
	Subtotal			41	0	41	3
Univac	I/II	$ 25,000	3/51-11/57	13	3	16	X
	III	$ 25,400	8/62	48	46	94	X
	SS-80/90	$ 8,000	8/58	69	74	143	X
	418-I/II	$ 13,700	6/63- 9/64	100	117	217	X
	418-III	$ 19,600	7/69	21	25	46	15
	491/492	$ 27,000	12/61	40	27	67	X
	494	$ 41,400	2/66	65	32	97	10
	1004	$ 1,900	2/63	1175	1570	2745	X
	1005	$ 2,550	4/66	765	190	955	X
	1050	$ 8,800	9/63	212	165	377	X
	1103/1105	$ 35,000	12/50-9/58	8	3	11	X
	1106	$ 40,000	12/69	20	21	41	31
	1107	$ 57,000	10/62	21	23	44	X
	1108	$ 68,000	9/65	137	92	229	22
	1110	$ 79,000	11/71	-	-	-	3
	9200	$ 1,700	6/67	1225	640	1865	265
	9300	$ 4,000	9/67	665	760	1425	220
	9400	$ 10,000	5/69	49	138	187	90
	LARC	$135,000	5/60	1	0	1	X
	Subtotal			4634	3926	8560	656
Xerox Data Systems	Sigma-5	$ 11,500	8/67	150	50	200	20
	Sigma-6	$ 20,000	11/70	3	0	3	15
	Sigma-7	$ 24,000	12/66	92	28	120	10
	Sigma-9	$ 44,000	9/71	-	-	-	NA
	940	$ 24,000	4/66	42	8	50	X
	9300	$ 8,500	11/64	39	6	45	X
	Subtotal			326	92	418	45
	TOTALS			48,446	29,809	78,255	14,667

ANNUAL COMPUTER STOCK SUMMARY

The following table summarizes computer stock price activity for both calendar 1970 (Jan. 2 to Dec. 31, 1970) and the past year (Feb. 27, 1970 to Feb. 26, 1971). The list differs slightly from that previously carried on a regular basis so that the table will include the leading computer field companies except for some large conglomerates whose computer-related business is small relative to total sales.

	Last Twelve Months					Calendar 1970				
	70-71 High	70-71 Low	Feb.26,1971 Close	One Year Net Change	One Year % Change	1970 High	1970 Low	Dec.31,1971 Close	1970 Net Change	1970 % Change
NEW YORK EXCHANGE										
Address.-Mult.	62	20	30	- 14	- 32%	62	20	27	- 33	- 55%
American R&D	100	37	53	- 36	- 40	100	37	47	- 37	- 44
Ampex Corp.	49	13	19	- 20	- 51	49	13	18	- 30	- 63
Automatic DP	53	24	52	+ 5	+ 11	50	24	45	+ 2	+ 5
Bunker Ramo	15	6	12	- 1	- 8	15	6	10	- 4	- 29
Burroughs	173	79	108	- 41	- 28	173	79	109	- 50	- 31
Collins Radio	37	9	16	- 9	- 36	37	9	15	- 21	- 58
Computer Sciences	34	5	12	- 13	- 52	34	5	10	- 24	- 71
Control Data	123	29	58	- 7	- 11	123	29	51	- 68	- 57
DPF&G	32	7	14	- 8	- 36	32	7	12	- 19	- 61
Digital Equipment	124	49	67	- 46	- 41	124	49	57	- 48	- 46
Electronic Assoc.	12	4	7	- 1	- 13	12	4	5	- 6	- 55
Electronic Mem.	40	6	10	+ 2	+ 25	40	6	9	- 30	- 77
Honeywell	152	66	98	- 41	- 29	152	66	83	- 61	- 42
IBM	387	219	337	- 3	- 1	387	219	318	- 47	- 13
ITT	60	31	55	- 4	- 7	60	31	51	- 9	- 15
Leasco	31	7	19	--	--	31	7	16	- 14	- 47
Memorex	167	45	58	- 76	- 57	167	45	57	- 91	- 61
Mohawk Data Sci.	87	18	30	- 47	- 61	87	18	26	- 47	- 64
National Cash Reg.	63	29	39	-107	- 73	63	29	39	-122	- 76
RCA	35	18	31	+ 1	+ 3	35	18	27	- 8	- 23
Raytheon	38	16	35	+ 6	+ 21	34	16	28	- 5	- 15
SCM	25	11	17	- 3	- 15	25	11	14	- 11	- 44
Sanders	30	7	17	- 2	- 11	30	7	13	- 14	- 52
Sangamo	29	9	18	- 7	- 28	26	17	15	- 11	- 42
Singer	86	53	71	- 8	- 10	86	53	65	- 20	- 24
Sperry Rand	40	19	31	- 7	- 18	40	19	26	- 11	- 30
Teledyne	40	13	26	- 1	- 4	40	13	24	- 16	- 40
Telex	26	9	16	-118	- 88	26	9	17	- 76	- 82
Univ'ty Comput.	99	13	24	- 36	- 60	99	13	22	- 75	- 77
Western Union	48	31	47	--	--	48	31	42	- 2	- 5
Xerox	116	65	96	+ 5	+ 5	116	65	87	- 18	- 17
AMERICAN EXCHANGE										
Applied Data Res.	24	4	12	+ 1	+ 9	24	4	5	- 19	- 79
CalComp	36	10	26	- 4	- 13	36	10	25	- 3	- 11
Comput. & Softw.	76	16	32	- 32	- 50	76	16	30	- 36	- 55
DPA, Inc.	10	3	6	- 1	- 14	10	3	4	- 6	- 60
Data Products	26	5	8	- 14	- 64	26	5	7	- 17	- 71
Greyhound Computer	14	5	9	- 4	- 31	14	5	7	- 7	- 50
ITEL	26	6	17	- 3	- 15	27	6	16	- 7	- 30
Levin-Townsend	19	3	6	- 6	- 50	19	3	5	- 14	- 74
Milgo Elect.	41	15	18	- 44	- 71	41	15	25	- 42	- 63
Potter Instrument	43	15	21	- 21	- 50	43	15	17	- 21	- 55
Systems Eng. Labs.	49	10	14	- 28	- 67	49	10	16	- 32	- 67
URS Systems	21	5	10	- 15	- 60	21	5	8	- 20	- 71

	70-71 Bid High	70-71 Bid Low	Feb.26,1971 Bid	One Year Net Change	One Year % Change	1970 Bid High	1970 Bid Low	Dec.31,1971 Bid	1970 Net Change	1970 % Change
OVER-THE-COUNTER										
DASA Corp.	44	4	8	- 28	- 78%	44	4	6	- 31	- 84%
Data General	36	16	29	- 23	- 44	36	16	21	- 22	- 51
Digitronics	14	3	6	- 6	- 50	14	3	4	- 10	- 71
Fabri-Tek	9	2	3	- 4	- 57	9	2	2	- 4	- 67
Gen'l Automation	42	9	19	- 23	- 55	42	9	11	- 23	- 68
Informatics	21	4	9	- 5	- 36	21	4	8	- 13	- 62
Interdata	3	22	7	- 13	- 65	13	3	6	- 11	- 65
Optical Scanning	52	11	17	- 21	- 55	52	11	13	- 39	- 75
Recognition Equip.	84	12	21	- 47	- 69	84	12	14	- 61	- 81
Tally Corp.	23	10	13	- 9	- 41	23	10	12	- 6	- 33

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Review and Forecast

E|D|P industry report

• THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" MARCH 12,1971 • VOL.6,NO.9 P.J.McGOVERN,EDITOR

A year of contrasts

SHIPMENTS PLATEAU FOR THIRD STRAIGHT YEAR AS U.S. FEELS ECONOMIC PINCH; INDUSTRY REVENUES UP 15%; NEW PRODUCT DIRECTIONS SET BY IBM, OTHER MAINFRAMERS

Definitely flattening what had been an ever-increasing growth curve, computer shipments by U.S. manufacturers, for the third year in a row, hovered just above the $7 billion level in 1970, barely squeaking out a 1% growth to almost $7.3 billion worldwide. But by almost every other yardstick, however, things really measured up well for the computer industry . . . fighting as it was the undertow of economic recession and the end of IBM's computer generation marketing cycle.

- Total worldwide computer-related revenues to U.S.-based companies steadily climbed another 15%, approaching the $12-billion level.

- International shipments of computer hardware were up about 25%, underscoring the importance of multinational operations and completely offsetting the drop in U.S. shipments to the lowest level since 1967.

- Users continued to increase spending, even in the U.S., where only about 40% reported the economy pinching their budgets. Many, however, turned to lower cost independent peripherals as an economy move.

And 1970 was filled with announcements that set the style of computer hardware for the next several years. As a result, users will not be asked to "reset to zero" and move upward with an incompatible system. Starting at midyear:

+ IBM spelled out the first models of System/370, introduced System/7 as its entree into the manufacturing automation portions of many businesses, and brought state-of-the-art technology to the marketplace with the 145 and 135 and their semiconductor memories.

+ RCA countered with its 2, 3, 6, and 7 -- going after a healthy chunck of the IBM 360 base with an enlarged sales force.

+ Burroughs improved its product line, offering its 700 family to customers and talking in terms of large multi-processing systems.

+ NCR and Univac added more models to their current product series, and Honeywell -- busy integrating the GE computer interests -- brought out several price/performance improved versions of previous equipment.

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Thus, with product directions basically set by IBM and the other major manufacturers, EDP/IR anticipates a new round of shipment increases. The peaks and valleys won't be quite so pronounced this time around, but worldwide shipments by U.S. manufacturers are expected to increase in the neighborhood of 15% for the next two years, slowing to about 10% by the mid-1970s. By that time, however, annual shipments of computers should be in the $12 billion to $13 billion range.

During the "pause" in shipment growth that has just passed, several interesting phenomena emerged in the structure of the computer industry. Plug-to-plug compatible equipment has been accepted by users, third-party leasing companies declined in relative importance, and unbundling has yet to have much effect on the industry as a whole.

But most important by any standard has been the clear illustration of the "flywheel effect" caused by both the sheer bulk of the industry as well as its basic rental nature: Most users are locked in to an ever-increasing volume of computer expenditures and, as a result, total revenues to computer companies will continue to increase. With a $30 billion installed base, the computer industry will never see the dramatic gyrations of the mid-1960s.

Preliminary forecasts for 1971 -- prepared by the International Data Corporation, publisher of EDP Industry Report -- indicate:

- Worldwide shipments will be up about 15% to well over $8 billion, and IBM will set the industry pace;
- Total industry revenues will be up 17% to 18%, to the $14 billion level, with revenues from general-purpose computers up about the same percentage;
- Service segments of the industry will continue to be important, but hardware will still account for 75% of total revenues.

Throughout this issue, as is always the case for EDP/IR, the term shipments means totally new-built equipment. It is our best estimate of factory production and includes complete new systems, peripheral equipment or "add-on" shipments such as additional core memory for existing central processors, and terminals for use with computer systems. It does not include equipment merely re-shipped from one customer to another.

AFTER SECOND ANNUAL SHIPMENT DROP, IBM ONCE AGAIN WILL SET A HEALTHY PACE

IBM didn't close out 1970 with any record-breaking results. Shipments were up in the international marketplace, but off enough here to force worldwide output about 4% (or some $200 million) lower than 1969 in a second consecutive drop.

On the other hand, it really ended last year in a more normal position than might be imagined at first glance. The economic downturn has bottomed; a new product line has been introduced and shipments already have begun; and the backwash from a boom of System/360 shipments and third-party leasing purchases is over. EDP/IR thinks that IBM once more will settle down to its more traditional pattern of 15% to 17% growth.

Also, IBM seems to have returned to a traditional pattern in another sense. Its salesmen are out there swinging in the marketplace. Ever since the antitrust

ANALYSIS OF GENERAL PURPOSE COMPUTERS INSTALLED IN THE UNITED STATES
(Based on IDC Computer Installation Data File, January 1, 1971)

Size Class	Purchase Price	Rental Range	% by Number	% by $ Value
Small	less than $115K	less than $2,500	20	3
Medium	$ 115K - $ 460K	$ 2,500 - $10,000	44	19
Large	$ 460K - $1,850K	$10,000 - $40,000	33	59
Very Large	over $1,850K	over $40,000	3	19

guns were leveled at IBM during the winter of 1968-69, a certain cautiousness had creeped into the company's outward attitude. Lawyers seemed to be running things. But with salesmen not able to even approach what was perhaps an ambitious quota for 1970, and with the independent peripheral manufacturers stealing away business for economic reasons, IBM seemed to have reached a threshold of pain. Once again, the name of the game is all-out marketing.

And the product line is ready. Announcement after announcement was capped off this week when IBM introduced the 370/135 -- a very communications-oriented system. A thorough analysis of IBM's new line will appear in the next issue, but in a nutshell its products for the 1970s look like this:

- System/370, a new family of computers renting from $10,000 a month on up, brackets almost 80% (by value) of the base of existing computer users (see above). Though offering new features and better price/performance, the 135, 145, 155, and 165 are completely compatible with System/360 and emulate second-generation equipment much better than does the 360.

- System/3, Model 6, a small business computer that starts at less than $1,000 a month, seems to be IBM's way of affirming that it plans to switch most electronic accounting machine users over to the computer.

- System/7, dubbed a "sensor based" computer, has been talked about as a minicomputer. It could be used in the same way as many minis, and since it can be rented, it may bring new economics to the mini industry. But the computer will be marketed primarily for new control applications, and could well create in the factory a base for computer business comparable to that established in the office by the 1401 in the early 1960s.

IBM's marketing plans for System/370 seem primarily aimed at retaining customers. But in IBM's case, this philosophy opens a base for business that the same policy simply couldn't bring to other manufacturers. A significant amount of IBM equipment -- well over $2 billion -- is owned by third-party leasing companies; even more has been purchased by the users themselves. Thus, by simply switching users of this IBM equipment back to renting, the industry giant can make substantial revenue gains in addition to upgrading its present rental base.

With all this going for it, then, IBM's shipments are expected to be up more than 15% this year to the $5.5 billion level. Also, it should receive increasing amounts of business from services it began pricing separately at the start of 1970. Because of the economy and the age of installed computers, IBM didn't benefit greatly from its unbundled policy last year; indeed, with the price reduction, perhaps it just broke even. But with new machines being shipped and a growing number of new users, IBM will now have more program products to sell, new people to educate.

"OTHER" MAJOR MAINFRAMERS AGAIN OUTPERFORM IBM WITH 10% SHIPMENT INCREASE; INDEPENDENT PERIPHERALS ZOOM; OTHER SECTORS AVERAGE 24% REVENUE GAINS

Following a pattern very similar to that set in 1969, new computer shipment activity again last year was essentially level, with IBM down 4% (see above) and the other major manufacturers up, on average, 10%. Most of them continued the trend set a year before, with CDC down an even larger percentage, Burroughs, NCR, and DEC up not quite so much as in 1969. RCA had the real turnaround: Following a 10% shipment drop in 1969, it came back strong with an increase of 26% for 1970.

The overall industry picture, and IBM's relation to it, has been reviewed above; in the following pages we take a look at the other hardware manufacturers and at the various other sectors of the computer industry. In general, the industry proved its staying power and survived the economic downturn pretty well: Total computer revenues to American-based companies were up 15% in 1970, and are expected to increase another 18% or so this year.

Honeywell Information Systems, officially established last fall when Honeywell bought out General Electric's general-purpose computer interests, had shipments slide off 6% to just below $600 million on a pro forma basis. Still, however, it had merged its way solidly into the Number Two spot, and now is working out the reorganization necessary to take advantage of its doubled base.

During 1970, Honeywell did quite well with the small H-115 in a disk-only configuration. About 300 were ordered and delivered during the year, and the current backlog is about 200 more systems. After the merger, HIS also had an even smaller competitive computer in the GE 58. This European-designed computer competes with the IBM System/3, and HIS quickly changed a four-city test marketing situation to a national sales effort.

In the large systems area, the Gecos operating system and the new 6000 line (EDP/IR Feb.22,1971) could really open new markets for HIS. The biggest problem here is the operating system -- it is considered very good, but is difficult for both salesmen and customers to understand. An intensified training program for salesmen is designed to rectify this.

Honeywell's big entry in the data capture market, the Keytape, has peaked in shipment level, but HIS currently has great hopes for its Keyplex multi-station system. It is also active in the EDP education and service bureau business, and should maintain market share in most of its computer-related areas.

For several months, now, HIS has been making new product announcements, and more are expected; but these are mostly just price/performance improvements of existing products from both the Honeywell and GE lines. A new product line is direly needed, but most observers agree that it won't be announced during 1971. The true future of HIS, then, will not be clear until the new product line is set. In general, however, the company has most if not all the characteristics that lead to success in the computer industry, and its management is dedicated to turning its assets into a smoothly running and profitable operation. Shipments this year are expected to be up just a fraction to about $600 million.

Univac duplicated its gains of last year with another reasonable shipment increase of 11%, split between a level performance in the U.S. and about a 25% rise internationally. The 1106 did quite well, with over 40 units shipped worldwide, but only three or four customers have expressed serious interest in the 1110 so far.

TABLE I
STATUS OF WORLDWIDE COMPUTER MARKET FOR U.S.-BASED MANUFACTURERS

	1970 Shipments: $M	% Total	1969-70 % Change	Yearend 1970 In Use: $M	% Total
IBM	4,775	65.5	- 4	25,555	69.3
HIS	590	8.1	- 6	2,900	7.9
Univac	465	6.4	+11	2,220	6.0
Burroughs	410	5.7	+18	1,210	3.3
NCR	305	4.2	+55	805	2.2
RCA	275	3.8	+26	1,145	3.1
CDC	210	2.8	-19	1,545	4.2
DEC	100	1.4	+34	425	1.2
XDS	60	0.8	-13	425	1.2
Others	95	1.3	+35	570	1.6
Totals	7,285	100.0	+ 1	36,800	100.0

The company has carried out a very successful program of converting older 1108s to purchased systems that include modified 1004s or 1005s as remote-entry processors in a communications-oriented installation. Many customers don't realize this, knowing only that they have a special remote-batch terminal; but from Univac's point of view, it is a way of continuing to collect revenues on equipment that has been around for six to eight years.

Univac's biggest success story for 1970 comes in connection with its 1700 line of buffered keypunches. Over 25,000 of these units have been sold throughout the world, most of them replacing older IBM equipment. Now that IBM has its competitive 129 keypunch, Univac's shipments of these data entry devices will probably be slowed, especially since it probably has already signed up the "easiest" accounts. But the success of the 1700 goes to show that, from time to time, a competitor can made inroads into areas that IBM has considered sacrosanct.

During 1970, Univac was impacted by Federal Government cutbacks in new computer acquisitions, and this effect should continue. There will probably be a few announcements of middle-of-the-line improvements -- an extension of the 9000 series above the 9400 level -- but nothing dramatic is expected. 1971 shipments should be up by another 8% to 10% to about the $500 million level.

Burroughs announced the large end of its new 700 family during 1970, chalking up a better-than-average 18% gain in shipments to over $400 million. But the most talked about aspect of 1970 was the question of how well the 6500 actually works. Stories from the field are mixed. Users who ordered the 6500 as an upgrade from a 5500 doing foreground/background processing seem pleased; more ambitious customers with sights set on fancy multiprogramming applications have had to suffer with normal delays. These are primarily the fault of the MCP operating system, but it is considered basically a good system by users, and most of them continue to reflect their loyalty, knowing that eventually it will work.

Another flap occurred last year when TWA filed a lawsuit over a planned reservation system. The situation, obviously, reflects a misunderstanding between Burroughs and TWA over the scope of and responsibility for this effort. In vast information management systems such as those required for an airline, the hardware -- at least the central processor -- becomes almost insignificant. Instead of requiring a few programmer-months for fine tuning, an installation such as this necessitates hundreds of man-years. In any event, with this system out and with Univac no longer supplying a similar system for United Airlines, IBM now has every major airline's reservation business locked up with its Pars system.

Burroughs continues to be successful with its TC-500, and keeps bringing out new models for specialized applications. Over 2500 are now installed. And the new 700 family will probably prove a success -- once software problems are ironed out -- and smaller models will follow. It doesn't look like a system that will be highly competitive with IBM equipment, but it will provide a good upgrade for Burroughs customers and could win a few competitive situations. Shipments this year are expected to be up another 15% to 20% to the $480 million level, with stronger gains internationally than in the U.S.

NCR has meant computers for over a year, according to the national ads, and now it means "computers . . . and terminals." The company emphasized its point in 1970 by once again posting the highest shipment increase -- up 55% to just over $300 million -- of any computer manufacturer. The percentage increase was actually higher in the U.S. than abroad, indicating that there was room for success during a year of economic concern.

Two new systems -- the Century 300 and 50 -- were announced, but neither can be expected to have the success of the 100 or 200. The C-300, for example, will appeal almost exclusively to NCR users who want to upgrade their current equipment. The C-50 certainly appeals to a large base, but this is a base already impacted heavily by IBM with System/3. With this small computer, NCR for perhaps the first time will really be coming head-to-head with IBM in its sales efforts.

Prospects do look good in one area, as indicated by the advertisements. Last year NCR brought out its 280 retail terminal that could have great impact, and it had good success overseas with similar equipment as the United Kingdom turned to decimilization. With its well-established contacts in retail areas, NCR can likely expect to move more large companies over to terminal usage. But the fantastic growth rates simply can't continue, and we expect that NCR will have only a 20% to 25% shipment growth -- to the $380-million level -- for 1971. The increase should be at the same rate both within and outside the U.S., indicating the shift toward more upgrade business.

RCA, the only major manufacturer with no direct sales activities in the major international markets, did quite well in the U.S. last year, reflecting favorably on its new management team and increased sales force. Shipments were up over 30% to well above the $200 million level. Indeed, with a similar percentage increase expected to bring RCA's U.S. business to the $300-million level this year, it could close out 1971 nearly if not actually Number Two manufacturer in domestic shipments. On a worldwide basis, however, RCA is not expected to budge from its position as Number Six among the major manufacturers.

During 1970, RCA followed closely behind IBM in announcing new products -- the 2, 3, 6, and 7. These computers are essentially repriced versions of the Spectra 70/45, 46, 60, and 61, with expanded memory capacity. The machines seem to be

TABLE II

WORLDWIDE COMPUTER MARKET
(U.S.-BASED MANUFACTURERS)

	Number Systems Shipped	Cumulative Number In Use	$ Million Value Shipped	Cumulative $ Billion Value In Use
		TOTAL		
1969	19,650	90,200	7,240	30.7
1970	22,650	109,400	7,285	36.8
1971	36,200	140,800	8,315	43.7
1972	49,000	183,100	9,720	51.9
1973	57,300	230,700	10,985	61.1
1974	66,800	286,500	12,145	71.3
1975	83,700	350,700	13,500	82.4
		GENERAL PURPOSE COMPUTERS (GROUP A)		
1969	13,430	70,400	6,820	29.5
1970	11,610	78,400	6,760	35.0
1971	20,100	95,100	7,685	41.3
1972	23,800	114,400	8,970	48.8
1973	27,700	136,500	10,105	57.2
1974	30,100	161,100	11,120	66.5
1975	35,800	189,500	12,310	76.6
		DEDICATED APPLICATION COMPUTERS (GROUP B)		
1969	6,220	19,800	420	1.24
1970	11,350	31,100	525	1.75
1971	16,500	47,300	630	2.35
1972	23,400	69,600	750	3.05
1973	29,300	96,700	880	3.86
1974	35,400	128,500	1,025	4.78
1975	42,500	165,700	1,190	5.83

price/performance competitive, but the company apparently is banking its success on marketing, a concept familiar to the top computer management team recruited from IBM during the latter part of 1969 (EDP/IR Aug.31,1970).

RCA's primary marketing efforts will be aimed at users of IBM 360/30s, 40s, and 50s (under DOS) that need memory more than souped-up CPUs. One characteristic of its approach will be a guaranteed conversion plan under which RCA promises to shift certain IBM users over to its equipment for a specified amount and within a specific amount of time. Also, RCA offers a six-year contract under which the user gets guaranteed price protection and essentially owns the computer after the

TABLE IV

DEDICATED APPLICATION COMPUTER MARKET (GROUP B)
(U.S.-BASED MANUFACTURERS)

	Number Systems Shipped	Cumulative Number In Use	$ Million Value Shipped	Cumulative $ Million Value In Use
		WORLDWIDE		
1969	6,220	19,800	420	1,240
1970	11,350	31,100	525	1,750
1971	16,500	47,300	630	2,350
1972	23,400	69,600	750	3,050
1973	29,300	96,700	880	3,860
1974	35,400	128,500	1,025	4,780
1975	42,500	165,700	1,190	5,830
		UNITED STATES		
1969	5,285	16,500	340	1,000
1970	9,680	25,600	400	1,390
1971	14,290	39,400	475	1,840
1972	20,320	58,750	565	2,365
1973	24,600	81,400	645	2,960
1974	27,900	106,200	725	3,610
1975	30,700	133,400	835	4,350
		INTERNATIONAL		
1969	925	3,300	80	240
1970	1,670	5,500	125	360
1971	2,210	7,900	155	510
1972	3,080	10,850	185	685
1973	4,700	15,300	235	900
1974	7,500	22,300	300	1,170
1975	11,800	32,300	355	1,480

time is up; RCA, of course, gets guaranteed revenue from the particular account. The most important announcement that can come from RCA during the next year or so will be details of its full-fledged entry into the international marketplace. This is considered not a matter of if, but of when, since multinational operations are a must to long-range success in the computer business.

CDC, off almost 20% in shipments during 1970, had the worst performance of any mainframe manufacturer. And the accompanying red ink in its computer operations illustrates the company's lack of a substantial rental base and, thus, its heavy dependence on outright sales for revenues. Shipments of just over $200 mil-

TABLE III

GENERAL PURPOSE COMPUTER MARKET (GROUP A)
(U.S. BASED MANUFACTURERS)

	Number Systems Shipped	Cumulative Number In Use	$ Million Value Shipped	Cumulative $ Billion Value In Use
		WORLDWIDE		
1969	13,400	70,400	6,820	29.5
1970	11,610	78,400	6,760	35.0
1971	20,100	95,100	7,685	41.3
1972	23,800	114,400	8,970	48.8
1973	27,700	136,500	10,105	57.2
1974	30,100	161,100	11,120	66.5
1975	35,800	189,500	12,310	76.6
		UNITED STATES		
1969	8,450	46,500	4,555	20.8
1970	5,300	48,600	3,970	23.8
1971	10,300	56,200	4,325	27.0
1972	12,270	65,000	4,985	30.8
1973	13,700	74,500	5,380	34.9
1974	14,200	85,100	5,900	39.4
1975	17,750	97,500	6,575	44.4
		INTERNATIONAL		
1969	4,980	23,900	2,265	8.7
1970	6,310	29,800	2,790	11.2
1971	9,800	38,900	3,360	14.4
1972	11,530	49,400	3,985	18.1
1973	14,000	62,000	4,725	22.4
1974	15,900	76,000	5,220	27.1
1975	18,050	92,000	5,735	32.3

lion were composed primarily of 6400s and 6600s, although quite a few 3300s went to customers outside the U.S.

International shipments were up substantially last year, but they were from a small base and not nearly substantial enough to offset an almost halving of U.S. business. In addition, CDC's sales of OEM peripherals were off, as other mainframe manufacturers such as Honeywell turned in-house for most if not all of their disk drives and the like. The market for independent peripherals was extremely good in 1970 (page 11), but CDC did not have the end-user marketing organization to take advantage. It has announced a shift of emphasis in this direction.

There is enthusiasm in some quarters that Star -- the superscale string array processor -- will be CDC's salvation. One or two of the computers are on order, and there is talk that General Motors and a few other large companies will soon be signing up. But, without extensive general-purpose software for the giant computer, CDC can hardly expect sales of even 10 or 12 Stars, scarcely enough to sustain its position in the computer industry. And a new product line does not appear near, but business enhancements for the 6000 series are expected this month.

To be successful over the long term, it would seem, CDC needs an effective entry into commercial computing so that it can build up a rental base. For several years it has had the resources to develop such a capability, but corporate commitment in this direction has not been forthcoming, and 1971 shipments will at best be level. Prospects look best abroad, and even stronger international efforts could come from CDC's study consortium with ICL and CII.

Digital Equipment moved solidly into the Number Eight spot among manufacturers during 1970, exceeding XDS in shipments for the second straight year and thereby pulling level in value of installed base. DEC's $100 million of 1970 shipments were up 34% over 1969. This 1.4% of shipments is almost three times the 0.5% rate DEC attained only two years earlier. The company ships the lowest portion of its output of any company in the international market, but this percentage is growing slowly. During 1970 it moved up a couple of points to just over 20%.

During 1970, however, the mixture of DEC's shipments shifted considerably. As shipments of the time-sharing PDP-10 peaked last summer, DEC's computer business was more highly concentrated in the minicomputer business than ever before. It is still the dominant minimanufacturer, with 40% of the installed base and 40% of last year's shipments. Also, continuing along a course charted about a year ago, DEC seems really committed to becoming a total systems supplier. To this end, quite an array of peripherals were announced at last year's Fall Joint, and more are known to be in the works. Shipments for calendar 1971 should be up another 20% to 30%, with perhaps another slight shift upward in the international portion of its mix.

XDS, for the first time in nine years, showed a loss on its computer operations during 1970. Shipments of just over $60 million were 13% below the 1968-1969 level, and less than 1% of the industry total. The company's problems are parallel to, though smaller than, those of Control Data: It has always had excellent hardware with good price/performance, but software has been weak; it has stressed purchases rather than rentals, and relies heavily on market sectors related to Federal spending.

The Sigma 6 and 9 computers, announced during 1970, appear to be simply price/performance imporvements of the Sigma 5 and 7 rather than a significant entry into the business data processing marketplace. A move in this direction has been anticipated since Xerox acquired SDS in March 1969, as were changes in management direction. Little happened on this front until quite late in 1970 when the year's results were predictable and obviously going to be bad. Recent cutbacks in work force look like a quiet retrenchment aimed at restoring at least a breakeven situation. The biggest development expected for 1971, in fact, is a return to profitability.

Other computer manufacturers, for all intents and purposes, means minicomputer manufacturers, and their results are counted as part of the dedicated application computer market. This industry sector includes special computers such as process control systems, but with shipments in this area apparently awaiting the impetus of IBM's System/7, this category is almost entirely minicomputers with CPs priced below $25,000.

During 1970, approximately 11,000 minis -- up some 80% over 1969 -- were shipped by U.S.-based manufacturers. The value of the shipment increase, however, was only 25% because there was a decided shift away from the $40,000 or $50,000 system and toward OEM shipment of CPUs only. These are typically worth $10,000 to $20,000. This trend should continue during 1971, with the number of shipments increasing another 45% to about 16,000, but the value going up only 20%.

As mentioned above, Digital Equipment is still the leader in the minicomputer marketplace, with about 40% of total installations and of shipments last year. Hewlett Packard shipped over 10% of the minis last year, bringing its installed base above that of Honeywell in number. Honeywell pretty much held its own and remains one of the major mini manufacturers. Other companies with shipments that exceeded their percentage of the installed base were Varian, Data General, General Automation Inc., Interdata, and Computer Automation Inc. Newcomers into the computer business -- such as Lockheed and Micro Systems Technology -- shipped well over 100 units each and poked their head above the large number of other manufacturers with very limited production.

All of the 60 or so other manufacturers of decidated application computers (excluding major mainframers as well as those listed above) shipped almost 15% of the total number of systems last year, but they actually accounted for about 30% of the Group B installed base. Concentration is definitely going on, and during the next few years there are likely to be dropouts of minicomputer manufacturers.

Almost all the dedicated application computer business today is on a purchase basis, and shipments represent revenues to the manufacturers. As IBM enters this marketplace with its System/7, however, it will introduce the rental concept to the world of the small computer. This could put pressure on other manufacturers to rent their product, even though the System/7 is more of a system component than a stand-alone minicomputer. If such pressure is applied, it could mean that most minimanufacturers will have to find the capital to finance a rental base, but also would mean that this portion of the computer marketplace would begin to look more like the general-purpose sector -- rental based and therefore less subject to rapid revenue fluctuations.

Independent peripheral shipments, up a little over 30% last year, should continue to increase at a healthy rate this year as users realize that plug-compatible units offer equivalent or better performance at a lower price. The tightened budgets of 1970, in fact, acted as a definite boon to the independents. Many users were told, essentially: "Do the same volume of work, but with less money." And rather than fire their own staff, they turned to equivalent but less expensive equipment. This trend will continue to some extent, but the course will be a little tougher for the independents because IBM felt the pinch, and has reacted.

The last six months or so give a perfect illustration of what can happen when IBM is pinched, as it were. IBM seems to have a threshold of pain at about the 8% to 10% outside penetration level, so when independent shipments of 2314-type disk drives spurted from nothing to nearly the 6% level during the last six months of 1970, IBM made a bold move. It announced that its 2314 drives would be available -- as the 2319 -- in clusters of three spindles at lower per/spindle prices. Similarly, the new 3400 series tape drives represent an effective price reduction.

As a result of these moves by IBM, the independent peripheral manufacturers were forced to cut their own prices if they wished to continue with a competitive edge. And this price erosion, in most cases, implied profit erosion. As a result,

TABLE V -- TOTAL WORLDWIDE REVENUE
ESTIMATED & PROJECTED REVENUE TO AMERICAN-BASED COMPANIES FROM KEY SECTORS OF THE EDP INDUSTRY
($ Millions)

	General Purpose Computers	Dedicated Application Computers +	Independent Peripheral Equipment *	Data Processing Supplies =	Computing & Data Processing Services	Contract & Packaged Software	Total
1961	845	20	90	485	180		1,620
1962	1,210	35	115	530	220		2,110
1963	1,760	60	130	595	265	5	2,815
1964	2,220	105	140	630	295	20	3,410
1965	2,670	120	150	660	355	50	4,005
1966	3,440	145	180	740	425	100	5,030
1967	4,620	220	270	850	530	175	6,665
1968	6,110	315	360	960	715	270	8,730
1969	6,780	430	435	1,075	940	450	10,110
1970	7,625	525	570	1,170	1,235	535	11,660
1971	9,010	630	720	1,325	1,500	550	13,735
1972	10,965	745	890	1,490	1,810	660	16,560
1973	12,780	880	1,070	1,650	2,250	790	19,420
1974	15,000	1,025	1,250	1,825	2,530	930	22,560
1975	17,000	1,190	1,440	2,010	2,960	1,085	25,685

+ Through 1970, virtually all Dedicated Application (Group B -- see page 15) computers were purchased by the user, and scrappage rates have been low. This trend should continue until 1972, when there will be volume shipments of IBM's System/7, which will be offered on a rental basis. Since user attitudes and actions cannot yet be determined, EDP/IR has considered Group B annual shipments as revenues.

* Independent peripheral equipment is supplied in a variety of ways: Some is sold directly to the end user, some is rented, and a substantial portion is supplied at OEM prices to other manufacturers or to third-party leasing companies for rental to the end user. There will be an increasing trend toward rentals, but data is not yet available, so in this table EDP/IR has considered annual shipments, at list price, as revenues.

= About 20% of the supplies business is in magnetic tape and disk packs, some of which are rented to customers. Since this is only a small portion of the total supplies business, all shipments have been counted as revenues.

some independents will be squeezed rather hard. The ones that continue to thrive will probably be those with a broad line of equipment that they can continue to sell at the national account level, offering virtually a total package of peripherals at a small discount under IBM, rather than specializing in a particular unit and underpricing it substantially.

Supplies revenues of almost $1.2 billion were up only 9% over 1970, but the expectations for 1971 and beyond are for a more normal 12% to 13% yearly growth. Some 80% of this business is still in punched cards or paper, with sales of magnetic tape and disk packs accounting for about $200 million in revenues, primarily to IBM, Memorex, and 3M. The market for 2314/2319-type disk packs will continue to grow, and a new market for 3330 disk packs should open up once significant deliveries of this new drive start next year.

Service bureaus and time sharing were the largest non-hardware growth area last year, with revenues up 27% despite the failure of many time-sharing companies. Those that survived have a fairly good outlook, because there are still many companies that can't justify their own computer but that have increasing data processing requirements. The local batch processing portion of this industry sector is by far the largest, with over $900 million in revenues in 1970 and expected to grow to over $1.1 billion this year. The smaller components of this sector -- remote batch, conversational time sharing, and computer information services -- will grow over 30% to nearly $400 million during 1971, giving this area the second highest growth rate among all the computer industry sectors.

Software, as Table V shows, will grow very little this year as a total sector. This is because there are extreme variations within the general category. Revenues from manpower services (system engineer time, to use IBM parlance) will increase about 15% during 1971 and revenues from standard software packages is expected to rise about 65% to over $80 million. Contract programming for systems such as airline reservations will be down a little, however, and equipment manufacturer subcontracts will be off significantly this year. As a result, only minimal growth is expected and total software revenues for 1971 should be in the $550 million range.

Leasing revenues are not included in the table because it represents primarily payments by users for equipment already purchased from the manufacturer. The third-party leasing industry ceased making major new purchases last year, dropping from an estimated $1.4 billion in new purchases in 1968 to about $300 million, primarily of add-on equipment, last year. Purchases this year should be no more than $150 million as leasing companies buy equipment only when necessary to satisfy customers of their third-generation equipment. Leasing company revenues, however, should increase about 9% to the $650 million level as equipment stays out and last year's placements contribute a full year of payments. With IBM's System/370 equipment unattractive to leasing companies, the outlook is for revenue increases of 9% to 10% a year, and many of the companies are looking for ways to diversify. A few are developing into broader-based suppliers, offering independent peripherals and setting up services such as time-sharing operations.

Education revenues grew about 40% from a small base in 1970, and should experience another 20% growth to about the $200 million level this year. Some of this money is spent by individuals preparing themselves for better jobs, some is paid out by employers to train their staff. IBM will benefit from the latter type as users train their operators and programmers on their new 370s. Accompanying this, however, will be a significant shift to in-house education as users send only a few personnel to school, then have them train other employees.

TABLE VI

HISTORICAL REVIEW OF WORLDWIDE COMPUTER ACTIVITY
BY U.S.-BASED MANUFACTURERS
(Values, in $Millions, calculated as new purchase price)

	Number Systems Shipped	Cumulative Number In Use	$ Million Value Shipped	Cumulative $ Billion Value In Use
1955	150	250	65	0.18
1956	600	800	170	0.34
1957	1,000	1,700	280	0.60
1958	1,400	2,950	460	1.03
1959	1,700	4,500	600	1.60
1960	2,200	6,500	720	2.27
1961	3,400	9,300	1,100	3.26
1962	4,500	12,600	1,400	4.51
1963	5,600	16,800	1,710	5.97
1964	7,500	24,000	2,200	7.92
1965	7,400	31,000	2,400	11.1
1966	10,200	40,600	3,900	14.3
1967	18,700	57,600	5,350	18.9
1968	14,700	69,400	6,710	24.5

TABLE VI (above) is repeated so that the reader will have historical data for reference and comparison with the projections in this issue. A few figures have been modified slightly on the basis of recent information, so care should be taken when comparing these figures with others published previously. Because of space limitations, these historical figures are not presented in their U.S. and international components. For such information, the reader is referred to the 1970 Review and Forecast issue, published on March 12, 1970.

Also, it should be noted that, because of Census changes introduced in the Nov. 28, 1969 issue of EDP/IR, the totals in Table VI cannot be compared directly with current estimates and projections. The EDP/IR Census today consists of a General Purpose Census (Group A -- see pages 18 and 19) and a Dedicated Application Census (Group B -- see pages 15 through 17). The new Census includes all computers summarized above, but also includes a number of Group B machines (primarily minicomputers) that were not reported during most of the 1960s.

This change in reporting had little effect on the total value of computers installed -- only about $250 million worth of computers would be added to the almost $25 billion reported in use at yearend 1968. In other words, the 1968 worldwide total for all computers produced by U.S. suppliers was understated by about 1%, well within the margin for error. In terms of numbers of computers, however, the story is different. Minicomputers (included in the Group B totals) are now being shipped at a rapid rate, and the "Cumulative number in use" figure shown above is about 10,000 units smaller than it would be if these computers were included in the totals.

DEDICATED APPLICATION DIGITAL COMPUTER CENSUS

The data listed below for Dedicated Application General Purpose Computers (Group B) is based on the best information available to the International Data Corporation, and much of it has been verified by the manufacturers. Comments or corrections should be directed to EDP/IR's census editor.

Group B computers, for the purposes of this Census, are defined as those commonly called minicomputers as well as certain larger systems usually designed or used for one dedicated application such as process control, data acquisition, or the like. These computers are word oriented, usually purchased, and predominately programmed in assembly language. They have been grouped as follows:

Class	Average System Purchase Price	No. of Models Currently Marketed
1	$ 1 - $24,999	64
2	$ 25,000 - $49,999	35
3	$ 50,000 - $99,999	24
4	$100,000 - Above	22

Some of the companies in this Census do not actually manufacture computers; rather, they buy processors from an Original Equipment Manufacturer and market them as shown. These firms are identified with an asterisk (*).

AS OF JANUARY 1, 1971

NAME OF MANUFACTURER	COMPUTER MODEL	NOTES	BITS PER WORD	PRICE CLASS	PURCHASE PRICE ($1,000) BASIC	PURCHASE PRICE ($1,000) AVERAGE	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS IN U.S.	NUMBER OF INSTALLATIONS OUTSIDE U.S.	TOTAL NUMBER OF INSTALLATIONS	TOTAL NUMBER UNFILLED ORDERS
*Astrodata	ADAC	a	12	1	4	9	8/70	3	0	3	3
Atron	501		8	2	8	35	9/69	65	0	65	NA
Autonetics	Recomp-II		40	4	95	127	11/58	20	5	25	X
	Recomp-III		40	3	65	94	6/61	7	2	9	X
Bailey Meter	755		25	4	80	110	11/61	32	3	35	X
	756		25	4	90	180	2/65	14	6	20	X
	855/25		25	4	100	400	12/68	8	0	8	17
*Beckman Instruments	82		12	3	32	62	8/67	37	9	46	
BIT	480		8	1	6	7	12/66	195	3	198	X
	483		8+1	1	8	10	1/70	90	32	122	480
Cascade Data Computer	80/20		8	2	29	35	6/70	4	0	4	NA
	80/30		8	2	32	40	1/70	17	0	17	NA
Cincinnati Milacron	CIP/2000	b	8/9	1	2	4	12/69	NA	NA	NA	211
	CIP/2100	b	8/9	1	5	7	7/69	NA	NA	NA	11
	CIP/2110				5						
	CIP/4000		18+2								
Clary Datacomp	404		16	1	12	25	11/69	20	10	30	350
Collins Radio	8400			4		950	11/62	25	5	30	X
	8500		32	4	200	1000	1/67	49	13	62	7
Comcet	10			1		17	6/69	21	0	21	NA
	20		8	3		80	/70	2	0	2	75
	40		8	4		270	6/69	10	0	10	NA
	60		8	4		370	6/69	11	0	11	NA
Compiler Systems, Inc.	CSI-16		16	2	11	50	11/70	20	0	20	80
	CSI-24		24	3	15	75	11/70				30
Computer Automation Inc.	108		8	1	5	8	1/71	-	-	-	20
	208		8	1	5	8	8/69]	]	0]		20
	808	c	8	1	5	8	4/68]	140]	10]	150	70
	116		16	1	8	11	8/70	15	0	15]	
	216		16	1	8	11	7/69	130	10	140]	225
	816		16	1	10	12	12/68	40	5	45]	
Computer Development	CD-200		8	1	7		8/70				
*Computer Logic	CLS-18		18	1	10	14	2/71	-	-	-	NA
Computer Signal Processors	CSP-30		16	3	85	100	6/70	6	0	6	3
Control Data Corp.	160		12	4	60	112	5/60	49	11	60	X
	160-A		12	4	90	225	7/61	200	65	265	X
	160-G		13	4		535	3/64	35	0	35	X
	924/A		24	4		430	8/61	26	1	27	X
	1700		16+2	4	37	170	4/66	290	75	365	30
	8090		12	3		96	5/64	116	89	205	X
	8092		8	3		67	6/64	60	0	60	X
	G-15		29	3		61	7/55	265	18	283	X
	LGP-21		32	2		42	12/62	140	13	153	X
	LGP-30		32	3	49	59	9/56	290	43	333	X
	RPC-4000		32	4	87	101	10/60	61	12	73	X
	CSC-46		21	4		250	/56	10	0	10	X
	CSC-136		25	4		275	/60	4	1	5	X
	CSC-636		15	4		300	10/63	13	2	15	X
	Subtotal							1559	330	1889	30
Datacraft	6024-1	d	24	4	51	180	5/69	11	0	11	3
	6024-3		24	3	33	75	2/70	26	1	27	58
Data General Corp.	Nova		16	1	8	11	2/69	675	75	750	700
	Nova-800		16	1	7		4/71	-	-	-	
	Nova-1200		16	1	5		2/71	-	-	-	
	Super Nova	e	16	1	10		4/70	80	0	80	200
	Super Nova-DC		16	1	12		6/71				
Datamate Computer Systems	DM-16		16	2	15	26	11/69	10	0	10	2
	DM-70		16	1	9	15	8/70	5	0	5	9
	DM-70/ROM		16	1	4	6	8/70				
	ECP-18		18	1	14	15	11/66	21	0	21	X
*Data Processing International	DPI-500	a	12	3	50	70	7/69	12	0	12	25
Diglac Corp.	3080		25	1	20	25	12/64	14	0	14	X
	3080-C		25	2	26	30	10/67	5	0	5	1
Digital Computer Controls	D-112	f	12	1	4	10	7/70	35	5	40	300
Digital Equipment Corp.	PDP-1		18	4	120	136	11/60	48	2	50	X
	PDP-4		18	3		74	8/62	31	5	36	X
	PDP-5		12	2	30	36	9/63	73	10	83	X
	PDP-7		18	3		66	11/64	76	24	100	X
	PDP-8		12	1	18	24	5/65	1185	255	1440	X
	PDP-8/E		12	1	3	10	4/71	-	-	-	NA
	PDP-8/I		12	2	13	25	3/68	2760	940	3700	200
	PDP-8/L		12	1	8	20	10/68	3320	580	3900	250
	PDP-8/S		12	1	10	18	9/66	840	185	1025	X
	PDP-9		18	3	35	70	12/66	305	131	436	X
	PDP-9/L		18	2	20	33	11/68	34	14	48	15
	PDP-11		16	1	11	15	4/70	430	115	545	200
	PDP-12		12	2	15	35	4/69	380	95	475	150
	PDP-15		18	3	16	55	2/70	292	85	377	150
	Linc-8		12	2	38	48	9/66	94	40	134	X
	Subtotal							9868	2481	12,349	965
Digital Scientific Corp.	ETA-4		16	3	9	125	4/70	27	0	27	250

AS OF JANUARY 1, 1971

NAME OF MANUFACTURER	COMPUTER MODEL	NOTES	BITS PER WORD	PRICE CLASS	PURCHASE PRICE ($1,000) BASIC	PURCHASE PRICE ($1,000) AVERAGE	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS IN U.S.	NUMBER OF INSTALLATIONS OUTSIDE U.S.	TOTAL NUMBER OF INSTALLATIONS	TOTAL NUMBER UNFILLED ORDERS
EMR Computer	210		21	4	94	132	4/62	9	0	9	X
	420		42	4	324	450	6/63	3	0	3	X
	2100		21	4	65	143	12/63	8	0	8	X
	6020		24	4	72	176	4/65	15	2	17	X
	6040		24	4	98	224	7/65	10	1	11	X
	6050		24	4	123	360	2/66	19	6	25	X
	6070		24	4	240	600	10/65	1	2	3	X
	6130/6135		18	3	39	62	10/67	53	10	63	10
	6120		16		8		7/70				
Elbit Computer Ltd.	100		12	1	5		1/68	5	200	205	50
Electronic Associates Inc.	640		16	2	25	50	6/67	95	45	140	X
	1020		16	2		25	2/64	100	25	125	X
	8400		32	4		400	6/65	19	6	25	X
*Electronic Engineering Company of California	EECO-1600	g	16	3		100	5/70	1	1	2	3
Electronic Processors	EPI-118										
Foto-Mem, Inc.	Centauer-100		8/16	1	6	16	4/70	11	0	11	90
Four Phase Systems	IV/70		18		6		2/71				
GRI Computer Corp.	909	h	16	1	4	9	1/70	65	8	73	300
General Automation Inc.	GA-18/30		16	2	19	50	7/69	25	0	25	25
	SPC-12		8	1	4	17	1/68	550	50	600	150
	SPC-16		16	1	12	25	5/70	30	0	30	15
General Electric Co. GE/PAC	30	i	8	1	11	25	5/69	65	5	70	35
	312		20	4		200	3/60	27	6	33	X
	412		20	4		300	7/62	39	8	47	X
	3010		16	4	13	160	5/70	2	0	2	8
	4010		24	4	76	200	10/70	2	0	2	16
	4020		24	4	79	240	2/67	172	49	221	59
	4040		24	4		120	8/64	45	20	65	X
	4050		24	4		280	12/66	23	2	25	X
	4060		24	4		340	6/65	18	2	20	X
Hewlett Packard Co.	2000-A	j	16	3	89	101	11/68	149	62	211	13
	2000-B	k	16	4	119	134	8/70	3	1	4	4
	2000-C		16	4	187	205	3/71				11
	2005-A	l	16	3	72	85	6/69	25	5	30	5
	2007-A	m	16	1	20	20	9/68	41	11	52	4
	2114-A		16	1	10	16	10/68	419	119	538	X
	2114-B		16	1	9	15	11/69	429	108	537	53
	2114-C		16	1	9	15	4/71	-	-	-	NA
	2115-A		16	2	15	26	11/67	267	65	332	6
	2116-A		16	2	22	32	11/66	85	15	100	X
	2116-B		16	2	24	40	9/68	623	156	779	7
	2116-C		16	2	20	45	11/69	24	4	28	72
	Subtotal							2065	546	2611	175
Honeywell (CCD)	116		16	3		65	4/68	172	35	207	X
	316		16	2	8	27	6/69	496	120	616	195
	416		16	2	17	43	4/67	198	130	328	X
	516		16	3	25	55	10/66	604	180	784	25
	19		19	4		140	5/61	3	0	3	X
	24		24	4		200	5/63	82	3	85	X
	124		24	4	65	130	3/66	109	15	124	X
	224		24	4	75	380	3/65	55	8	63	X
	324		24	4		400	7/68	6	0	6	X
	290		18	4		175	11/60	10	2	12	X
	610/620	n	24	4		180	9/63	22	6	28	X
	632		32	4	97	240	12/68	8	4	12	7
	1642	o	16	4	144		4/71	-	-	-	NA
	1644	o	16	4	192		4/71	-	-	-	NA
	1646	o	16	4	252		4/71	-	-	-	NA
	1648	p	16	4	375	440	12/69	14	3	17	6
	H-21		20	3		63	2/66	41	25	66	X
	Subtotal							1820	531	2351	233
IBM	1710/1720		6	4		225	2/67	82	33	115	X
	1800		16+2	4	47	235	2/66	860	285	1145	75
	System 7			2		37	11/71	-	-	-	NA
Imlac	PDS-1		16	1	10	11	2/70				
*Information Instruments	PDQ-II	q	8	3	6	72	4/70	25	0	25	10
Information Technology	4900/5		8	1	3	5	10/70				25
	4900/10		16	1	10	20	10/65	25	0	25	X
	4900/20		16/32	3	30	50	10/69	6	0	6	
Infotronics	Mini/max		16	2	17						
Interdata	1		8	1	4	11	9/70	5	1	6	70
	2		8	1	9	11	7/68	20	0	20	X
	3		16	1	11	20	5/67	240	20	260	X
	4		16	1	9	15	8/68	280	20	300	90
	5		16	2	11	25	7/70	9	1	10	30
	15		16	2	22	35	1/69	60	4	64	13
Interplex	System 1		16	2	47	47	9/70				
Lockheed Electronics Co.	MAC-16		16	1	13	22	2/70	285	20	305	145
	MAC-Jr		16	1	10		9/70				
Micro Systems Technology	800		8/9	1	3	8	1/69	108	23	131	NA
	810		8	1	6	10	1/69	189	2	191	NA
	812		8	1	11	15	12/69	16	0	16	NA
	820				7	8	10/70	4	0	4	NA
	400				4	4	10/70	8	0	8	NA
*Mini Comp	MD-708		8	1	5	7	6/70	10	0	10	100
	Administrator-2		16	3	35	52	12/70				
	Multi User-E		16	3	67	85	11/70				
	Multi User-I		16	3	40	58	1/71	-	-	-	

AS OF JANUARY 1, 1971

NAME OF MANUFACTURER	COMPUTER MODEL	NOTES	BITS PER WORD	PRICE CLASS	PURCHASE PRICE ($1,000) BASIC	PURCHASE PRICE ($1,000) AVERAGE	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS IN U.S.	NUMBER OF INSTALLATIONS OUTSIDE U.S.	TOTAL NUMBER OF INSTALLATIONS	TOTAL NUMBER UNFILLED ORDERS
Modular Computer Systems	Modcomp-II		16	2	10	27	12/70				
	Modcomp-III		16	3	14	100	1/71	-	-	-	
Motorola Instrument and Control	MDP-1000		8	1	8	19	2/69	50	0	50	NA
Northwest Data Systems	803		16				8/69				
	804		16				8/69				
	903		16								
	904		16								
Nuclear Data	ND-812		24				1/71	-	-	-	
Omnicomp Computer Corp.	Omnus-1		16	1	5	12	4/71	-	-	-	NA
Qantel Corp.	Qantel-V		8	2	14	26	4/70	30	0	30	NA
Raytheon Computer	703		16	1	13	20	10/67	165	30	195	X
	704		16	1	11	18	4/70	39	10	49	12
	706		16+2	2	19	36	5/69	36	12	48	7
	PB-250		22	2	33	48	12/60	155	20	175	X
	PB-440		24	4		140	3/64	18	2	20	X
	PB-520		24	4		128	10/65	26	1	27	X
Redcor Corp.	RC-70	r	16	2	18	30	3/69	100	10	110	50
Rolm Corp.	1601		16	2	20	28	2/70	25	2	27	NA
Sanders	SANDAC-200	s	16	3	50	100	3/69	9	0	9	6
Scientific Control Corp.	600 Series		24	3	31	80	10/65	230	0	230	X
	4700		16	3	16	50	3/69	19	0	19	4
	DCT-132		8	2	28	30	5/69	40	14	54	15
Spear	Microlinc		12	3	46	57	6/66	33	3	36	X
Spiras Systems	65		16	1	10	20	8/69	20	0	20	NA
Systems Engineering Labs	810		16	2	38	45	9/65	24	0	24	X
	810-A		16+2	3	18	90	4/67	211	5	216	32
	810-B		16+2	4	30	150	12/68	75	1	76	26
	840		24	3	65	80	11/65	3	0	3	X
	840-A		24	3	60	75	8/66	36	2	38	X
	840-MP		24+2	4	49	250	12/67	33	0	33	X
	72		16								
	86		32	4	200	325	6/70				
	88		32	4	350	600	3/71	-	-	-	NA
	Multidata-A		16	2	15	40	6/70				15
Tempo Computers/GT&E	1		16	1	14	22	11/69	20	0	20	NA
Texas Instruments	960		16+1	2	18	30	6/70	18	0	18	NA
	980	t	16+1	2	10	40	8/70	10	0	10	NA
Time Zero Corp.	90	i	16	3	50	67					
Unicom, Inc.	CP-8A		8	1	2	2	2/70	20	1	21	50
	CP-8B		8	1	2	2	3/70	12	0	12	40
	CP-8C		8	1	3	4	3/70	18	2	20	75
	CP-8D		8	1	5	5	4/70	5	0	5	7
Unicomp, Inc.	Comp-16		16	2	11	27	6/70	7	0	7	8
	Comp-18		18	2	12	38	8/70	8	0	8	8
Varian	520/i	u	8	1	7	13	9/68	200	95	295	485
	610		12	1		15	7/64	10	0	10	X
	620		16	2		37	11/65	75	0	75	X
	620/i		16/18	1	10	20	9/67	1300	60	1360	175
	620/f		16	1	11	25	11/70	13	0	13	250
	R620/i		16/18	2	14	28	7/68	25	1	26	2
	R622/i		18	2	15	30	7/68	30	2	32	70
	Subtotal							1653	158	1811	982
*Varisystems	PAC-16	v	16	1	4		8/69	14	0	14	
Wang Labs, Inc.	3300		8	1	14	20	9/70	NA	0	NA	45
Westinghouse Electric Corp.	50		14	1	16	23	8/64	165	20	185	X
	250	w	16	3	40	62	9/67	115	13	128	30
	510/580		18	4	85	110	6/63	110	20	130	X
	2000		16	2	10	27	8/69	75	27	102	80
	2500		16	2	10	45	4/71	-	-	-	NA
Weismantel Associates	WAICOM-16		16	3		90	11/70				
Xerox Data Systems	92		12	3		90	4/65	42	8	50	X
	910		24	3		120	8/62	168	15	183	X
	920		24	4		150	9/62	111	19	130	X
	925		24	4		200	12/64	13	2	15	X
	930		24	4	80	400	6/64	112	18	130	X
	CE-16		16	1	8	13	5/69	11	0	11	8
	CF-16		16	1	15	25	12/69	25	0	25	15
	CF-16/A	y	16	1		17	11/70				25
	Sigma-2		16	4	24	125	12/66	210	40	250	X
	Sigma-3		16	4	24	140	1/70	80	20	100	45
	Subtotals							772	122	894	93
	TOTALS							25,257	5,414	30,671	

Notes: * CPU purchased OEM and marketed by company listed
X No longer marketed or manufactured
NA Information not available

a Version of DEC-PDP-8/L
b Manufactured under licensing by Micro Systems - 800
c used in Data Instrument - key to tape
d used in Singer-Micrographic (Link Division) MS-6000 COM systems
e used in Applications Unlimited - Shared Processor
f used in Computer Machinery Corp. - key to tape
g version of Data General - NOVA
h used in Advanced Digital Systems, Inc. - LCS/5 tape control system
i utilizes Interdata-4
j utilizes 2116-B
k utilizes 2114-B or 2116-B
l utilizes 2116-B (Real Time Executive System)
m utilizes 2115-A or B (Educational Basic System)
n version of XDS - 910/920
o utilizes 2-316
p utilizes 2-516 and 416
q version of Varian 620/i
r used in Penta - Key Logic System
s utilizes Varian 620i
t test 90 units used in-house for real-time process-control
u used by Burroughs as TC-500 terminal
v manufactured by Photon, Inc.
w version of XDS - Sigma 2
y version of CAI - 116

GENERAL PURPOSE COMPUTER CENSUS

Counts in the General Purpose Digital Computer (Group A) Census, shown below, are based on the best information available to the International Data Corporation, but are estimates. Computer manufacturers, as a rule, do not directly supply this type of information, and it is only through the use of IDC's extensive data files and other information sources that such estimates are possible. The computers included in "Group A" comprise the bulk of digital computers in operation. They are byte or character oriented -- with the exception of large-scale scientific machines -- and are primarily programmed with higher-level languages. In addition to this Census, EDP/IR publishes a Dedicated Application Digital Computer (Group B) Census that includes minicomputers and specialized-purpose machines.

AS OF JANUARY 1, 1971

NAME OF MANUFACTURER	COMPUTER MODEL	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS IN U.S.	NUMBER OF INSTALLATIONS OUTSIDE U.S.	TOTAL NUMBER OF INSTALLATIONS	TOTAL NUMBER UNFILLED ORDERS
Burroughs	205	$ 4,600	1/54	1	11	12	X
	220	$ 14,000	1/58	9	2	11	X
	B-100 Series	$ 3,300	8/64	13	6	19	X
	B-200 Series	$ 6,500	11/61	246	135	381	X
	B-300 Series	$ 8,000	7/65	510	98	608	X
	B-500	$ 3,800	11/68	294	244	538	65
	B-2500	$ 6,500	2/67	177	69	246	45
	B-3500	$ 14,700	5/67	296	150	446	75
	B-4500	$ 29,000	11/71	-	-	-	30
	B-5500	$ 33,500	3/63	139	39	178	X
	B-5700	$ 27,000	12/70	1	0	1	30
	B-6500	$ 70,000	11/69	16	14	30	6
	B-6700	$ 67,000	2/71	-	-	-	30
	B-7700	$120,000	2/72	-	-	-	2
	B-8500	$200,000	4/69	1	0	1	X
	Subtotal			1703	768	2471	283
Computer Operations Inc.	Gemini	$225,000	6/71	-	-	-	1
Control Data Corp.	G-20	$ 19,600	4/61	6	10	16	X
	1604/A/B	$ 42,000	1/60	32	5	37	X
	31/3150	$ 10,500	12/64	106	52	158	13
	3170	$ 16,700	12/70	1	0	1	9
	3200	$ 14,000	5/64	61	45	106	X
	3300	$ 20,500	9/65	128	96	224	18
	3400	$ 23,700	11/64	4	12	16	X
	3500	$ 25,000	1/69	3	11	14	4
	3600	$ 48,000	6/63	26	19	45	X
	3800	$ 53,000	12/65	12	5	17	X
	6200	$ 39,000	11/70	2	0	2	4
	6400	$ 55,300	5/66	60	27	87	10
	6500	$ 65,500	12/67	15	2	17	4
	6600	$127,000	8/64	66	27	93	7
	6700	$137,000	7/70	2	0	2	4
	7600	$190,000	1/69	4	0	4	3
	Subtotal			528	311	839	76
Digital Equipment Corp.	PDP-6	$ 10,000	10/64	17	6	23	X
	PDP-10	$ 13,500	10/67	120	47	167	10
	Subtotal			137	53	190	10
Friden	System-10	$ 1,400	10/70	6	0	6	45
Honeywell Information Systems	G-5X Series	$ 1,400	1/66	50	1360	1410	160
	G-105	$ 1,350	3/69	17	45	62	20
	G-115	$ 2,500	4/66	257	1390	1647	80
	G-120	$ 3,200	1/70	14	65	79	40
	G-130	$ 4,400	10/69	2	55	57	15
	G-205	$ 2,900	6/64	5	0	5	X
	G-210	$ 16,000	3/60	23	0	23	X
	G-215	$ 6,000	9/63	7	0	7	X
	G-225/255	$ 8,500	4/61-10/67	140	23	163	X
	G-235/265	$ 14,500	4/64-10/65	100	19	119	X
	G-245/275	$ 18,000	10/69	2	1	3	X
	G-405/410	$ 7,200	2/68-11/69	27	2	29	5
	G-415/420	$ 7,600	5/64- 6/67	182	234	416	X
	G-425/430	$ 13,200	6/64- 6/69	64	80	144	X
	G-435/440	$ 14,800	9/65- 7/69	38	19	57	5
	G-605	$ 25,000		3	2	5	X
	G-615	$ 55,000	6/69	13	7	20	7
	G-625	$ 65,000	4/65	1	4	5	X
	G-635	$ 80,000	5/65	75	14	89	4
	G-645	$120,000	7/66	4	0	4	X
	G-655	$ 90,000	1/71	-	-	-	10
	H-110	$ 3,200	9/68	170	84	254	45
	H-115	$ 4,000	3/70	215	80	295	280
	H-115/2	$ 5,060	1/71	-	-	-	NA
	H-120	$ 5,000	1/66	700	400	1100	X
	H-125	$ 7,400	12/67	150	200	350	35
	H-200	$ 7,600	3/64	645	345	990	X
	H-1015	$ 8,400	4/71	-	-	-	NA
	H-12/1250	$ 10,500	2/66- 8/68	380	146	526	35
	H-2015	$ 12,800	2/71	-	-	-	NA
	H-2200	$ 19,600	1/66	110	75	185	12
	H-3200	$ 23,000	2/70	33	12	45	24
	H-4200	$ 28,500	9/68	23	6	29	6
	H-8200	$ 50,000	2/69	14	2	16	6
	H-400	$ 10,600	12/61	46	31	77	X
	H-1400	$ 14,000	1/64	4	6	10	X
	H-800	$ 26,000	12/60	58	13	71	X
	H-1800	$ 46,000	1/64	14	2	16	X
	Subtotal			3586	4722	8308	789

EIDIP industry report

• THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" MARCH 24,1971 • VOL.6,NO.10 P.J.McGOVERN,EDITOR

Now that the cards are dealt

WITH THE 370/135 AND EXPANDED SYSTEM/3 TO FILL OUT ITS PRODUCT LINE, IBM SETS THE MARKETPLACE TONE FOR THE EARLY 1970s

In double page newspaper spreads that quickly followed its simultaneous announcement meetings around the country, IBM told the world all about the latest model in System/370. Model 135, the ads said, is "just the right size for System/360 Model 25 and 30 users."

> Model 135 is everything System/370 is all about. It's designed to give you a computer that's easy to use, easy to afford, easy to move up to. And at the same time it opens up to you many more computer ap-aplications. Including remote computing.
>
> . . . Model 135's Central Processing Unit is up to 4 1/2 times faster than Model 30's. Just the kind of speed you'll need, not only to process data, but to control many aspects of your business. The kind of speed to handle applications such as remote computing, scientific computing, data base applications, and timesharing.
>
> In short, Model 135 means your entry into more sophisticated kinds of computing.

So there we have IBM's present sales pitch. When the industry giant starts tossing out the buzzwords other manufacturers have been trying to push, it adds up to a general thrust toward on-line computing.

The idea isn't new, but it has taken a lot longer than anyone originally dared to admit. For several years, EDP Industry Report has noted that the computer industry would move toward distributed computing, and now the "official announcement" seems to have been made. On top of IBM's move, Control Data last week announced a more formal step in this direction (page 6) than even IBM spelled out.

But the big push comes from IBM and its implied expansion into more areas of the customer's information handling business . . . its continual effort to bring in more money from its existing customers. Therefore, in conjunction with Computer System Architects, a consulting firm in nearby Cambridge, Mass., EDP/IR and its publisher, the International Data Corporation, have analyzed IBM's product line and apparent marketing goals for the early 1970s. A summary of this analysis is contained in this issue.

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"Everything" about System/370 adds up to heavy emphasis on communications

Pretty much as expected, the 370/135 was announced with monolithic circuitry throughout and the reloadable control storage or "floppy disk" that attracted so much attention on the 370/145. The 135, IBM says, has internal speeds up to 4.5 times faster than the Model 30 and 6.5 times faster than the 25. And along with the fast processor, IBM announced several features or peripherals that make the system well worth a careful look . . . especially since it is billed as "everything System/370 is all about."

- The system can have the integrated communications attachment (ICA), announced with the 360/25, that eliminates the need for a separate communications control unit such as the IBM 2701.

- With the integrated file adapter (IFA) first announced for the 370/145, the 135 can operate with a three-disk 2319 and up to two more 2314-type spindles without a separate disk control unit.

- In announcing that the new 3330 disk storage unit will operate with the 135, IBM stated that now this advanced drive will operate with all 370s under DOS as well as OS.

- A new programmable buffered terminal, the 3735, can handle invoicing and other business documents and operate as a remote batch terminal, much like the Burroughs TC-500. At present the 3735 offers only one document carriage, but otherwise seems to have more capacity than the TC-500, and costs a little less.

- New card handling equipment with a microprogrammed control unit implies that IBM hasn't yet given up the 80-column punched card. The 3505 reader -- "the fastest IBM has ever offered" -- has an optical mark reading feature that can read up to 40 columns of hand-penciled or pre-printed vertical marks in the same pass that reads the punched holes. The 3525 punch, which operates through the reader's control unit, has features that allow it to read, punch, and print a card in a single pass.

All the elements of the 135 announcement fit together to provide what IBM says is "economical and flexible entry into a wide range of advanced data base applications." And what this emphasis seems to mean is that IBM seriously plans to lead its customers into on-line business systems. Here's a rundown on CSA's ideas as to how IBM will go about this and how its products fit into the picture. It's also a pretty good checklist against which to measure competitive developments as they come up in the computer industry.

Requirements for on-line systems

In general, IBM's market goals aren't hard to define: Increase the customer base and make more money. Increasing the customer base means entry level business. In some cases such as an airline reservation system or a time-sharing operation, of course, "entry" level could be a 370/165 or some other system worth millions of dollars. In most cases, however, it means the small user, just starting off with a computer, and the success of System/3 illustrates IBM's capability in this area. And the Model 6 gives IBM an inexpensive product for the customer upgrading from accounting machines or punched card equipment.

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IBM makes more money, of course, by bringing in these new customers. But its other and more important way of making more money is by expanding its share of the present customer's dollar. Upgrade business, from the customer's normal growth, is important, of course. But IBM is more aggressive; it has more ambitious plans and wants more of the customer's total information processing budget.

This calls for centralized operations. The concept -- the highly touted management information system of the mid-1950s -- is not new. But realization of such schemes has taken a long time, for only now can hardware manufacturers think of satisfying the four basic requirements:

Capacity has been the most visible problem, the one easiest to measure. For hardware, two dimensions are important: storage capacity and processor capacity. On-line data storage today is almost all disk based, and could be said to provide the necessary massive capacity at reasonable cost. In the same manner, central processor speeds and main memory are adequate for data base handling requirements, with models in System/370 about four times faster and offering close to four times the internal storage of their 360 counterparts. So hardware capacity is no longer a critical problem.

But other types of capacity are needed. There must be software to take care of the physical capacity. Storage of massive data bases requires more than just a place to put it. It requires organization, control, procedures for backup, audit trails, and provisions for recovery in case of mechanical failure. Operating systems were a step in the right direction, and another whole level of data management can be found in the newer information products such as IBM's Information Management System/360, its Generalized Information System (GIS), and Customer Information and Control System (CICS), all available for System/370. Other mainframers are working on similar approaches, and Informatics offers one in its Mark IV package.

Finally, there is the need for communications capacity. How fast will information flow from the I/O devices to the central processor and in and out of memory? The 370/135, with optional selector channels, handles information at more than half the rate that a 360/65 will sustain, and the 370/165 handles four times the information of the 135: More than 10 million bytes per second can flow in and out of the 165's memory.

Dependability, of course, is of utmost importance: the system just cannot fail completely. After vacuum tubes were replaced with transistors ten years ago, the approach to reliability was to double everything, to put heavier steel in the doors, as it were. But pursuing this route leads quickly to the point of diminishing returns, so the reasonable alternative was adopted: Let it fail, but only some. In the military business, this approach is called soft failure and graceful degradation -- limit the errors, try to catch them as early as possible, and do something to prevent their spread.

This philosophy has been adapted to System/370 in two basic ways, both improvements over what's available in the 360:

- For instructions in the CPU, where data is manipulated, the philosophy is to retry. Extra registers and circuits are built into the hardware so that failures can be detected and operations retried if necessary.

- In the computer's primary memory, the improvement is in error detection and correction. The 360, with parity bits, can detect an error in an

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8-bit byte; the 370 uses correction codes -- developed at Bell Laboratories -- for fixing any single-bit errors in a word. Multiple-bit errors are detected only. Errors are logged so that customer engineers know where near-misses were and what might need fixing.

This emphasis on reliability is an important part of System/370, and IBM has coined a word for it: It's RAS, for reliability, availability, and serviceability. And IBM has a powerful tool for servicemen called Retain/370. Through a telephone network, field servicemen can call the repair center where experts on the particular equipment involved can bring their expertise to bear on problems. At this time, the system doesn't allow the central service consultant to hook directly in to the central processor, but this wouldn't be surprising in the future.

Accessibility is the requirement that really distinguishes on-line systems from off-line. The computer must get its "fingers" as close to the source of data as possible, deliver its information as close to the user as possible. Terminals for many requirements have been around for some time, as have communications (see page 7), but only recently has appropriate systems technology been available.

The original announcement of System/370 didn't have much to say about terminals or communications, though these were expected. System/7, announced shortly thereafter, began to fit the picture because it is designed as part of the scheme of getting the computer's fingers at the source and sinks of information. It will eliminate the middleman in many operations. And now, with the 370/135, IBM has caught up with the predictions and brought integral communications to the new family. It will certainly be only a matter of time before the capabilities of the 135 are extended up the line.

Evolvability is perhaps the most unrecognized requirement for on-line systems. You must have a way to get there. This is why 370's compatibility with 360 is extremely important. Many software and systems packages have been developed over the last five years, and every nickle of effort invested in software and system applications by 360 users can be used with the 370. The process was painful for many people, but those who invested their time are ahead today.

Equipment in use today is filled with various combinations of second-, third-, and fourth-generation hardware all mixed together. But they all perform the same function and, most important, a set of interfaces has been established -- hardware and software interfaces that are independent of particular machine models or implementation technology. These interfaces are important to plug-compatible peripheral manufacturers and to users with packages that rely on the operating system. They are well protected, because IBM's investment in the operating system is just as high as it is in the channel interface.

To protect this investment, and give itself more flexibility in the future, IBM has taken the hardware-in-software approach. For diagnostics and service routines, there is a floppy disk in every 370 model; for the smaller two, this disk is used as an equipment controller as well; and in the 135, as pointed out earlier, the communications controller is brought into the system in the same manner. Looking into the future, we forsee this approach virtually allowing IBM to design a new machine function, load it onto a new floppy disk for the customer, and pop it into the mail. This approach gives IBM account control, flexibility, and protection; it also makes things a little tougher for manufacturers of competitive equipment. But, then, IBM is in business to make more money.

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COMPARISON OF IBM PRODUCT OFFERINGS

MODEL	POWER (a)	COST/ BYTE (b)	MEMORY (000) Min.	MEMORY (000) Max.	MONTHLY RENTAL (c) Min.	MONTHLY RENTAL (c) Max.
System 3/10 (d)		$1.20-1.60	8	49	$ 435	$ 1,410
360/20-5	.10	2.20-3.00	8	32	875	2,050
360/25	.15	2.75	16	49	1,390	3,310
360/30	.23	1.65-2.60	8	65	1,275	3,870
370/135	.75	0.90	98	246	5,250	7,950
360/40	.44	1.52-2.47	16	262	2,675	10,190
370/145	1.4	0.88-1.15	114	524	10,425	18,725
360/50	1.00	1.31-2.27	65	524	8,340	19,935
370/155	3.0	0.50	262	2,097	21,500	45,150
360/65	2.5	0.90-1.47	131	1,048	19,685	51,015
370/165	10.0	0.50	524	3,145	39,000	70,800
360/75	3.1	1.47	262	1,048	31,725	60,260
360/85	12.5	1.65	524	4,194	62,240	145,500
360/195	30.0	0.95-1.44	1048	4,194	96,800	167,800

(a) A relative number, with the 360/50 rated as 1.0, established by EDP/IR on the basis of many estimates and inputs. The capability of a computer will vary widely depending on its use and total configuration; these "power" ratings are presented as a relative comparison of equipment.
(b) Calculated from published price lists. Ranges indicate the possible variation when different memory increments are selected.
(c) Calculated only for CPU, main memory as indicated, and -- in the case of certain 370s -- power supplies as required.

What else is expected?

Shortly before it came out with the 370/135, IBM announced "a major expansion in computing capability" for System/3, Model 10. Included were:

- Cobol and Fortran IV compilers -- at $75 and $100 a month, respectively -- to give users "a wider choice of high-level languages;"
- Higher-performance disk drives with "up to five times the existing disk storage capacity;"
- A sixth main core size -- 49,152 bytes -- that increases maximum memory capacity by 50%, up to that of the 360/25;
- The ability to attach the 1403 printer, which operates at nearly four times the current System/3 maximum of 300 lines per minute.

Because of this, and because of the late introduction of the 360/25, there is speculation as to whether or not IBM will ever bring out a 370/125. There are several reasons to think not: The first 25 was delivered late in 1968, and IBM has allowed more than five years between initial deliveries of all the "upgrade" models announced so far:

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360 Model	First Delivery	370 Model	First Delivery	Elapsed Time
65	11/65	165	4/71	65 months
50	8/65	155	2/71	66 months
40	5/65	145	8/71	75 months
30	6/65	135	5/72	83 months
25	10/68	?	?	?

If IBM holds to the same pattern, first deliveries of a 370/125 would be in 1974 at the earliest. There's always the possibility of a field upgrade for the 25, of course, and there is a precedent for this with the 7000 series.

But there are other considerations. On the one hand, IBM has a large base of stand-alone 25 and 30 users who might like the better price/performance of the 370 but not want to move all the way up to the 135. On the other hand, the company now seems committed to distributed computing.

Perhaps the IBM salesmen can once again prove their leadership with customers, moving them into new applications that require larger and faster computers. Or, as EDP/IR can't help but speculate, IBM could institute a more sophisticated form of unbundling . . . providing local computers that satisfy most of the on-site needs, connecting to centralized distribution points only for large bursts of power or access to special software. That is the route Control Data has announced (below).

WITH CYBER 70 FAMILY, CONTROL DATA BANKS ITS HOPES ON DISTRIBUTED COMPUTING

> *What remains now is for [CDC] to beef up its marketing staff enough to gain the sales it projects . . . and needs. If this company indeed has the correct outlook, it could be in a position to supply more and more of the distributed computer networks in this country. IBM has not really announced its thinking in this direction, so CDC's competitive stature can not be measured.*

That's what we said over two years ago (EDP/IR Dec.5,1968) when Control Data unveiled its 7600 supercomputer and we noted that it represented the future of CDC.

Today (see page 1) IBM has made its thinking clear. But little else except a name or two has been changed. CDC said last week it was scrubbing out 6000 and 7600 computers and replacing them with its Cyber 70 product line. Members range from the medium-scale Model 72 ($18,000 a month) to the super-sized Model 76, virtually a 7600 and priced at the same $200,000 a month.

Other "new" products in the Cyber 70 family include a "high-performance, mass storage subsystem" similar in performance to IBM's 3330; a batch terminal station; a high-speed communications subsystem; three stand-alone display and printer terminals; and a Cyberlink "hardware and software product" that ties in with the company's Cybernet data center network.

CDC spokesmen say that deliveries are fast: summer for the terminals, January 1972 for the communications stations and CPUs. Data stations and peripherals use integrated circuits and microprogramming, but CPUs, manufactured from subassemblies currently used in the 6000 and 7000 lines, contain discrete components.

So the major question, again, is marketing. CDC recently combined its peripherals, mainframe, and services sales forces into a single marketing group of

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over 1000 people. They are out convincing "management to precisely match equipment with their computer needs" through CDC's "unique solution to the old nemesis of computer overbuy." The family will give "users in the mixed business and scientific environment the most service for their data processing dollars . . ."

Can Control Data, at long last, move into the mainstream with its distributed computing approach? Has computer utilization finally reached the point such that a scientific approach will best handle business problems? Once again, but for different reasons, it's still too early to measure CDC's competitive stature.

FCC STRENGTHENS CARRIER BARRIER

Last week the FCC voted to make final its tentative decision on the regulation of computer-communications services (EDP/IR Apr.9,1970). First, data processing services won't be regulated. Second, Western Union and the telephone companies, except for AT&T, can offer data processing only through separate affiliates. Third, "hybrid systems" that combine message switching and data processing will be treated case by case as to whether their primary function is message switching or data processing; they will be regulated or left alone, accordingly.

But there's a catch. The communications common carriers won't be allowed to buy services from their DP affiliates. This is an addition to the original Tentative Decision and just squeaked past the FCC in a four-to-three vote.

GT&E and United Utilities -- the two biggest non-Bell telephone companies -- and Western Union all have affiliates which provide outside data processing and/or special computer-controlled message switching services. So does International Telephone and Telegraph, an international communications carrier. (And the FCC emphasized that this ruling applies to international carriers.)

General Telephone has a remote processing subsidiary, GTE Data Services, that does a small amount of outside processing, as well as Ultronics (a stock information service) and Brokerage Transaction Services, a joint venture with Control Data (EDP/IR Dec.21,1970). United Utilities has its United Computing Systems, a teleprocessing subsidiary. IT&T, through a series of data centers run by its subsidiary ITT Data Services, offers both local and remote processing.

Western Union owns a 46% interest in Western Union Computer Utilities, which franchises local service bureaus, and it has filed tariffs on two computer-controlled message-switching services, Sicom (for the securities industry) and Info-Com. Last June Bunker-Ramo, which uses WU lines and maintenance for its stock quotation service, brought a complaint against the communications company. It charged that Western Union was favoring its own Sicom customers over Bunker-Ramo users, and that it was expanding Sicom to include data processing services such as buy/sell order matching. The FCC mentioned this case as an example of potential problems and a prime reason for requiring maximum separation of DP affiliates.

The FCC's method for keeping everybody in line is as follows: Common carriers have the job of tattling to the FCC on any of their customers who may lease lines to provide what are essentially communications services for re-sale. They must also give advance notice if they (1) plan to offer a hybrid communications service, or (2) plan to supply their DP affiliates with communications to be used in hybrid data processing services. The FCC also forsees the situation where a common carrier wants to transfer a communications service over to its DP affiliate, once the service has become profitable or achieved a strong market position, with a little

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dressing up to make it into a hybrid data processing service. In this case, the carrier will have to justify the transfer.

In short: Firms that supply data processing services, remote or local, now seem to be fairly well protected from "unfair" competition by communications carriers. In particular, Western Union and the telephone companies can't channel resources into their DP affiliates through "sweetheart" contracts. However, a large area of potential controversy remains: The gray area of hybrid data processing, where message switching is incidental to computing, looks likely to grow. And the FCC promises to look at these situations only little by little.

NEW REGISTRATIONS BY COMPUTER COMPANIES

TERMINAL EQUIPMENT CORP.

Terminal Equipment Corporation, 750 Hamburg Turnpike, Pompton Lakes, N.J. 07442, which is engaged in certain aspects of the data and business information communication field, on Feb. 26 filed 110,000 common. The proceeds, at terms to be supplied by amendment ($10 maximum), will be used for general corporate purposes. The underwriter will be Milton D. Blauner & Co., Inc., 115 Broadway, New York 10006

TRANSPORT DATA COMMUNICATIONS INC.

Transport Data Communications, Inc., 122 Edinburgh Court, Greenville, S.C. 29607, which develops management information systems for the motor carrier industry, on March 5, filed 125,000 common. The proceeds will be used to retire bank loans and for general corporate purposes. The underwriter will be R. S. Dickson, Powell, Kistler & Crawford.

WESTERN UNION TELEGRAPH CO.

The Western Union Telegraph Co., 60 Hudson St., New York 10013, on March 2, filed a statement for $55M of sinking fund debentures. The proceeds (at terms to be set by amend.) will be used to pay the cash portion ($47M) of the price of AT&T's TWX service ($88.7M); any balance will be used for general corp. purposes. The underwriter will be Kuhn, Loeb & Co., 40 Wall St., New York.

ANNUAL COMPUTER STOCK SUMMARY -- CORRECTIONS

Please note the following changes in the table, page 20, EDP/IR March 12, 1971.

	Last Twelve Months					Calendar 1970				
	70-71 High	70-71 Low	Feb.26,1971 Close	One Year Net Change	One Year % Change	1970 High	1970 Low	Dec.31,1970 Close	1970 Net Change	1970 % Change
NEW YORK EXCHANGE										
Nat'l Cash Reg. (1)	63	29	39	-34	-47	63	29	39	-42	-52
Telex (2)	26	9	16	-11	-41	26	9	17	-2	-11
AMERICAN EXCHANGE										
Milgo Elect. (3)	41	15	18	-13	-42	41	15	25	-9	-27

(1) split, two-for-one, May 1970; (2) split, five-for-one, May 1970; (3) split, two-for-one, April 1970.

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E|D|P industry report

• THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" APRIL 9,1971 • VOL.6,NO.11 P.J.McGOVERN,EDITOR

INDEPENDENTS CONTINUE STRONG IN BILLION-DOLLAR SUPPLIES MARKET; DISK PACK PRICES BOTTOM OUT AS 3330 AND SYSTEM/3 PROMISE POTENTIAL NEW BUSINESS

During 1970, a year of recession, U.S. computer users spent 15% more on supplies than they did the year before. And, while this segment of the computer industry was quietly growing to $1.17 billion, it was also undergoing some changes that will affect its scope if not its size in the years ahead.

- Price cutting was blatant among disk pack manufacturers as supply caught up with demand. Volume was up significantly last year as prices bottomed and shipments of all removable disk packs hit the $115-million level.

- Punched card shipments, pegged very closely to computer use, increased healthily to $310 million, as System/3 users began to gobble up small - er cards and buffered keypunches assured card use for years to come.

- Shipments of magnetic tape reels grew only slightly to the $90 million level, reflecting a shift away from on-line use of tape. But a reasonable demand will continue since tape is still the primary media for archival storage.

- Paper forms still dominate the computer supplies industry, and shipments last year were up comfortably to $630 million. Users continue to hope that, some day, microfilm and visual displays will alleviate the need for many of today's forms; but it will be quite some time before the forms business drops below average in its growth.

Because at least major products are standardized, the computer supplies industry is one of the easiest for an independent to enter; on the other hand, he must have volume to offer the discounts expected. Thus the paper forms sector is dominated by three manufacturers -- Moore, Uarco, and Standard Register -- but smaller companies grab up much of the specialized forms business. In the punched card area, IBM is the single largest supplier, but there is competition and already several companies are looking to grab a chunk of the System/3 card business.

And in the magnetic supplies area, there is real competition. IBM has held its price umbrella while companies such as Memorex, 3M, Graham Magnetics, Caelus Memories, Honeywell, and CDC have made significant inroads. With new types of disk packs -- for the System/3 and 3330 -- about to become important, IBM may regain market share. But from what the other suppliers tell EDP/IR, this won't be easy. Much of this issue, therefore, is a discussion and analysis of what users and manufacturers tell us can be expected in the disk pack market.

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Disk becomes a way of life

Computer users had their first chance to use removable disk packs back in 1963 when IBM first delivered its small (for the time) 1440 computer that had a 1311 disk drive as its only on-line storage. Later that year, IBM delivered first models of the larger 1460 which offered the 1311 as an option. Meanwhile, during the same year, Control Data announced a drive that used the 1311 pack, Honeywell offered the CDC drive as an option with its H-200, and the market for disk packs was begun.

If this constituted a user acceptance test by IBM, it was a success. In 1965, as an option with System/360, IBM replaced the 1311 with a more advanced 2311 drive that used the same 1316 "6 high" packs. Then, in 1967, IBM announced its 2314 disk drive with its "11 high" 2316 packs. These newer packs, currently the best seller in the disk-pack market, store 29 million alphanumeric characters rather than the 7.25 million of the 1316.

During this period when disk packs really began to gain broad popularity (EDP/IR Nov.10,1967), the 1316 packs rented for $15 a month from IBM, if you could get them; otherwise, users paid as much as $1/day for "black market" packs until they waited out IBM's six-month delivery cycle. Naturally, with a supply situation like this, competitors entered the market as rapidly as they could. As a result, supply caught up with demand, it became a buyer's market, and many independent suppliers resorted to price cutting.

These cuts were possible because disk packs are generally considered to be a high-profit item. IBM didn't go along in a big way. It chose to maintain rental prices at $15 for the 1316, $20 for the 2316 but eventually offered substantial purchase discounts. Thus, as independents delayed income on their rental disks by slashing prices to less than half those charged by IBM, the industry leader apparently decided to lose market share rather than profit. As a result, IBM only shipped about one-fourth of all disk packs in 1970, but collected half or more of the total income, since packs installed previously continued to bring in revenue.

Growing shift toward disk

There's no question about the use of disk drives, and therefore packs, in the foreseeable future. Today, drives are used to some extent on almost 60% of all general purpose computer systems, and the equipment actually being shipped is even more heavily disk oriented. In the table below, which shows the distribution of computer shipments, "mixed" system refers to one with a combination of tape and disk drives. Thus, almost three-fourths of 1970 shipments were systems that had at least one disk drive.

GENERAL PURPOSE COMPUTER SYSTEM SHIPMENTS, BY NUMBER

Type of System	1966	1970	1974
Card	25%	8%	4%
Tape	34	18	12
Disk	19	27	31
Mixed	22	47	53

Estimates for 1974 do not include System/3 shipments, which slightly increase the percentage of card and disk systems, reduce that of tape and mixed.

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Users surveyed by the International Data Corporation, publisher of EDP/IR, confirm the trend toward the increased use of disk drives and packs. A summary of user attitudes, below, shows some of the trends that will lead to increased shipments of disk packs and that may have bearing on the acceptance of IBM's 3330 disk drive (see page 4).

- Both 2311 and 2314 type disk systems have been found convenient and reliable. Many data processing managers say their only problem is deciding how many drives will be necessary to meet expanding needs.

- Convenience of disk packs leads to wasteful programming. Many users order more packs rather than spend the time necessary to program efficient data storage.

- Disk systems provide the user with random access capabilities while, at the same time, they offer unlimited off-line storage. Packs can be removed from a 2314-type drive in about a minute and stored for future use when the data is needed on-line again. Thus, the units are more flexible than large fixed-head disk files, which must be dumped to tape for economical permanent storage.

- Multiprogramming and on-line applications have necessitated enlarged data storage capacities. Computers are utilized in a fundamentally different fashion, and since many systems now run more than one application or program simultaneously, extra memory is required.

- Central information systems are growing in popularity. These systems locate all information on-line in a central file, and for many applications the disk drive is the most convenient form of memory available.

Today's marketplace

Shipments of 1316 disk packs -- the product with which the independents got their start -- peaked during 1970, and the big market at present is for the 2316. There are several reasons for this. In addition to the natural upward movement that would have occurred, there is an expanded market now that drives for 2316 packs can be bought with fewer than eight spindles (EDP/IR Dec.21,1970). On top of that, System/3 now can support a drive that uses the same disk pack.

IBM, at present, still ships more 2316 packs than any single other supplier, but Caelus, Memorex, and 3M together outsell IBM by a considerable amount. And there are other suppliers that have concentrated on large volume sales to a relatively small number of customers. The competitive situation should continue for a couple of years since prices have stabilized and demand will continue to grow by at least 20% from existing users.

During the first part of 1971, two independents -- Century Data and Information Storage Systems -- have announced improved price/performance versions of a 2314-type drive that uses the 2316 disk pack. Systems such as these could help extend the market life for the 2316 as users go this route rather than all the way up to the higher-capacity 3330. Even so, Control Data and Telex are working together to produce an "advanced disk drive sub-system," most likely in the 3330 class. RCA is developing a drive, but has ordered 3330s for the interim. There's no guaranteed compatibility, however, because the exact specs of the 3336 disk pack for the 3330 won't be made public until first deliveries later this year.

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3330 or bust

Independent suppliers, therefore, have good markets at present for 1316 and 2316 packs. But those who don't develop a 3336 in time will see a dwindling number of customers. The 3330, IBM's newest removable disk pack drive (EDP/IR Aug.17, 1970) is now available on all models in System/370 and all but the smaller models of System/360. It would seem, then, that IBM will be out there marketing 3330 drives to most people who use its 2314s.

Manufacturing and marketing a 3336 pack (for the 3330 drive) at a profit may not be such an easy matter, even though -- at least initially -- independent prices won't have to be too far below IBM's $1,000 price tag. There seem to be several difficulties in producing the 3336 with its more stringent specifications. And it may take time for independents to overcome residual user reluctance to buy or rent the more sophisticated product from a second source. Here are some of the technical problems -- not insurmountable, but possibly more expensive than some of the independents care to risk:

- The 3336's aluminum substrate must be smoother than that of a 2316. Smaller producers may buy this portion of the disk readymade (from Caelus' parent, Electronic Memories and Magnetics, for example), but to keep profitability, the leading independents must make it.

- The coating for this substrate must be applied thinner and smoother than on the 2316. This poses a definite technical challenge, since pack suppliers generally do their own coating.

- The metal and plastic parts of the 3336 pack are different from those in the 2316, and they will require expensive retooling. According to one potential producer, this may take nine to twelve months, and it can only be carried out after the exact specs are known. Another manufacturer thinks there will only be a three-to-six-month delay between the shipment of IBM's new drive and the availability of a 3336-compatible disk pack.

- The 3336 has a "servo track," used for head control and rotational positioning, which must be written on one of the 20 recording surfaces by the disk manufacturer (leaving only 19 surfaces available to users). This task takes an amount of expertise in disk drive design that one pack supplier feels could be a barrier to some independents.

There's no question, of course, that several independents -- both today's leaders and probably some of the runners-up -- will go ahead with the development and marketing of a 3336 pack. Profitability, then, will depend on two things: Their ability to make and market the pack at, say, an initial purchase price of $900 to $950; and, over the longer run, IBM's own pricing strategy.

For comparative purposes, it's worth noting that one 3336 pack holds the same amount of information as about 3.5 of the 2316 packs. IBM will sell the 3336 for $1,000, and prices its 2316s at $525 apiece. So, if you could buy half-a-pack, the equivalent of a 3336 from IBM would cost about $1,800. From independents, the equivalent capacity in 2316-type packs would cost between $1,200 and $1,400.

IBM, to date, has announced only a purchase price for its 3336 pack. It does not sound like IBM not to rent, however, even though a potential competitor tells

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EDP/IR that he expects a sales-only market and therefore doesn't plan to rent his packs. The argument goes that IBM can sell packs during its "protected" period, before the independents enter the market, and not have to worry about early customers replacing later on with packs from the competition.

No matter what happens for the first six months to a year, IBM sooner or later will be forced to rent so that it can compete with independents. When this happens, another price war will probably be on. Today, IBM packs are rented for about one-twenty-fifth the purchase price (i.e., 25 months of rent would pay for a pack). At a similar rate, the 3336 would rent for $40 a month. And, since independents that rent have been using a higher ratio -- say about 40 -- this means that a 3336-compatible pack priced to sell at $950 would rent for about $24 a month.

But, then, if history indeed repeats itself, IBM will react when the independents begin to chew into its pack business. To date, as we have pointed out above, the reaction has been to lower the purchase price, holding the rental price level. A clever potential move would be for IBM to announce a price cut to, say, $850 while at the same time announcing that the pack could be rented. If the rental were pegged at a 36-month payout, the price would then be $24 a month.

A survey of disk pack users

In preparation for this issue, EDP/IR telephoned 45 computer users who have requirements for both 2316 and 1316 packs. The mainframes in use included models from Control Data, Honeywell, and RCA as well as IBM. The sites ranged from small (360/20, 25, or 30) to very large (360/65 plus multiple smaller computers). Because the survey is small, the numerical results should not be extrapolated; the interviews, however, do give a good feel for the marketplace, and the most striking observations are summarized below:

Caelus, Memorex, and 3M show up most often as independent suppliers of disk packs, but other independents popped up with large contracts at individual installations. Among the users of 1316 and 2316 type packs, 650 packs were from IBM, 368 from Caelus, 317 from 3M, and 196 from Memorex. Nashau was next largest with 130 packs, 120 of them all at one site. It must be repeated that these figures do not indicate market size; they do underline the status of Caelus, Memorex, and 3M as the leading independent suppliers. Other independents that cropped up at IBM sites in the study were Control Data, Data Automation (with one large customer), BASF, Wright-Line, and Mac Panel.

The disk business has shifted to a leasing game, both because disk packs are high-ticket items and because users are uncertain as to how long they will keep on using 2311- or 2314-type drives (and therefore need current types of packs). Also, some DP people say they can get packs automatically replaced by the supplier if they are damaged while on lease. (Suppliers see it another way: They pay for replacement if the damage is due to a faulty pack, but not if the user or disk drive causes the damage. However, the user usually gets the benefit of the doubt since this makes for good customer relations.) Of the more than 2000 disk packs used by people contacted in this survey, 16% were purchased, 12% were on third-party lease, and 72% were being rented from independents or the mainframer.

Central bargaining at the corporate level is the way prices and terms are being set for a number of users. One branch of a giant oil company, telephone company sites, an automotive manufacturing plant, and other users report getting packs under "national contracts." Similarly, the State of New York calls for bids to

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supply all its agencies' disk pack needs. A Federal Government user reports that he pays a Federal Supply Schedule price for his packs. Although the U.S. Government doesn't yet procure its packs centrally, it is likely to move in this direction as it already has with computer tape.

Sharp competition and high sensitivity to prices is reflected by the patterns of vendor presence at computer installations. A number of users -- 16 out of the 45 contacted -- have packs from more than one supplier; six of the 16 have packs from several. In many cases, this indicates that users have recently switched from IBM to independents, or even from one independent to another. Also, several users reported they were currently testing packs from one or more independents on a free trial basis.

The market for reconditioned packs

Talk of "used supplies" sounds, at first blush, like a discussion of the contents of a wastebasket. But disk packs aren't consumed the way some supplies are, and there is developing a "fair" market for some types of secondhand disk packs.

In the course of preparing this report, EDP/IR contacted a company that does disk pack reconditioning. This process involves cleaning, testing, replacing parts and the recording disks themselves as necessary. The cost for this service depends on how many recording surfaces are still useable. Typical charge for reconditioning a 1316 pack is around $80; for a 2316, it runs about $150.

This same company says it also sells reconditioned packs -- primarily IBM 1316s, since there is little demand for non-IBM packs and since not many used 2316s are yet available. The price for a reconditioned 1316 pack is about $125, and the supplier claims it's practically as good as new.

A good market to enter?

With things going as they are, the disk pack market looks like a good one for some of the existing suppliers, but one that is more likely to see contraction in the number of suppliers than expansion. At mid-1969, independents were selling 2316-type packs in the $400-to-$650 range. Today, the range is more like $300 to $400. And 1316-type packs have dropped from the $250-to-$400 range to between $175 and $210.

During the same time period, rental prices for independent 2316-type packs slid to around $9 a month, give or take a hard-nosed negotiator, and 1316-types have settled down at the $6.50 level. Prices can be less in large-volume contracts. Some of these cuts can be justified by manufacturing economies, but it would seem that the cream has been skimmed. Newcomers to the market would best be warned to stay out.

What's the upshot of all this? The independents are out there fighting with each other . . . gaining market share on IBM but making less money as they do. They seem to have concentrated in the volume-contract area, where marketing costs are lowest; moves to expand will therefore be more expensive. And with the 3330 disk drive looming in the wings, it may be time for careful reflection by the independents. In the past, IBM has priced its disk packs on about a two-year payout basis, and has introduced new drives (with new types of packs) about every three years. This could mean that a very important signal will be flashed when IBM announces the rental pricing structure for the 3336 pack.

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Magnetic tape rolls along

Although it is out-glamored by disk packs, magnetic tape will continue to represent a significant portion of the supplies market. Total sales in 1970 were in the neighborhood of $90 million, and steady if not outstanding growth is projected. Major suppliers of computer tape are Memorex (20% to 25%), 3M and IBM (15% to 20% each), and Graham Magnetics (about 10%). Prices have been declining for standard types of computer tape.

These declines, however, have not been as dramatic as those for disk packs, and there are developments that could slow the decline even more. The relatively new higher-priced back-coated tape is catching on for certain applications, and other developments continue to come along. Graham, for example, has just announced a new cobalt-iron coating material (to be used in place of the standard iron oxide) that is said to give recording densities of up to five times those in use today.

This certainly is a sign that tape isn't dead. For some time, now, rumor is that IBM is working on a new, high-capacity drive code-named Comanche. The Graham material might be used on tapes for such a drive. Another possible potential use, also, is for the tape cassette.

Slowly but surely, peripherals using tape cassettes are entering the market. This type equipment plays a miniscule role in the information processing industry at present, but companies are developing various data entry, data collection, and terminal devices that could lead to volume shipments of cassettes within the next few years. These cassettes will sell in the $5 to $10 range, rather than the $10 to $15 for standard computer tape, and will be a new portion of the supplies market.

Those cards keep coming

With the number of keypunch units in the U.S. expected to total nearly a quarter of a million even in 1975, it's obvious that the market for punched cards isn't going to disappear overnight. It was an estimated $310 million in 1970, and for at least the next several years the growth rate should be at least 10%.

But the product will change. System/3s are being shipped in great quantities, and a large portion of them are card oriented. Thus, the little 96-column cards are going to be big business. Already, Bobst Champlain, Inc. is turning out special S-III equipment to help the independent card manufacturers get into this market. Jersey Tab Card, a large East Coast card manufacturer, took first delivery of Champlain equipment earlier this year, and the company is shipping equipment to customers all across the U.S. as well as overseas.

Prognosis

The supplies sector of the computer industry is quite heterogeneous. More than half of it -- the forms business -- is simply an extension of a paper industry sector. The punched card portion, also a paper business, exists because IBM in the 1956 Consent Decree agreed to "divest itself . . . [of] existing capacity for the manufacture of tabulating cards as may [in 1963] be in excess of 50% of the total capacity for the manufacture of tabulating cards in the United States." Its competition in the card business comes mainly from regional operators.

The magnetic media portion of the supplies industry is more a reflection of the computer industry's need for secondary storage. Tape will continue to be used,

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therefore, because it is the least expensive means to have archival storage that is reasonably accessible as well as machine processable. And use of disk packs will grow as the user moves toward on-line storage.

The supplies industry, thus, reflects the input, output, and secondary storage requirements of users. With the installed base of computers at the $25 billion level in the U.S. alone . . . and growing steadily . . . the supplies industry can expect no sudden changes. Neither can it expect dramatic shifts in year-to-year growth. But things are happening. $1170 million can't all be boring.

It's a what?

IBM SLIPS IN A NEW PRODUCT -- SYSTEM/360, MODEL 22 -- AT THE LOWER END OF LINE

That's right! System/Three Sixty, Model Twenty Two.

IBM says its a "general purpose computer that combines intermediate-scale data processing capability with small-system economy." To EDP/IR, it looks like a version of the 360/30 priced between the 360/20 and 360/25. That would make the "new" product the lowest-priced true 360 available.

It also looks like the answer to the "What-is-IBM-going-to-do-with-all-those-old-thirties" question. The 360/22, with the same memory access time as the 30, "will have the same warranty as a new machine, but contains some reconditioned components" according to an IBM spokesman. First customer shipments are scheduled for August of this year.

The system currently is offered in two memory sizes: 24,576 and 32,768 bytes, and typical systems will rent for $5,500 to $6,000 a month. The Model 22 uses standard 2311 disk drives, runs under IBM's Disk Operating System, can have Cobol, Fortran, and RPG II. Its multiplexer channel and selector channel allow the attachment of medium-speed tape drives as well as disk, plus other peripherals such as typewriter-like terminals and display devices.

Why is it?

As soon as we heard about the 360/22, EDP/IR immediately thought about the 1401-H, quietly slipped into IBM's product line almost exactly four years ago (see May 4,1967 issue). That stripped-down version of the 1401 was based on "re-engineered" equipment, promised two-month delivery, and was eventually installed at some 500 user sites. The 360/22, similarly, looks like a limited version of the 30, perhaps designed for the Model 20 user who is input/output bound. The 22 will support the 1403-N1 printer that outputs at 1100 lines per minute.

Because it fits in where it does in price and performance, perhaps the 22 answers the question of whether or not there will be a 370/125. As pointed out recently (EDP/IR Mar.24,1971) deliveries of a 125 couldn't be expected before 1974 at the earliest if IBM holds to patterns established in the past. And this "new" computer could fill some of the gap. It allows the new or Model 20 user to become fully operational on a true 360 computer; it extends the income-producing life of at least some 360/30s; and it gives the IBM salesman one more goodie for his bag of tricks. This may be important if, as some reports indicate, the IBM sales force isn't zooming above quota. Maybe the 22 does make sense.

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EIDP industry report

• THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" APRIL 30,1971 • VOL.6,NO.12 P.J.McGOVERN,EDITOR

Another bubble about to burst?

INTEREST IN FACILITIES MANAGEMENT -- WHATEVER IT IS -- BLOSSOMS; SUCCESS DEPENDS ON USER WILLINGNESS TO SWAP CONTROL FOR SAVINGS

Stimulated, perhaps, by spring sunshine and a flowering of stock market activity, fads and fashions are returing to the computer industry. And investors, discouraged by results from past fads such as time sharing, proprietary software, and computer output microfilming, are seeing only the bright side of the latest fashion, a service activity called facilities management. Whether this amorphous new "industry" amounts to anything really depends on some fundamentals. And the outcome won't be known until users discover whether facilities managers will bring significant long-term savings to their EDP operations.

Current business activity by companies who say they are in facilities management would indicate that things are on the bullish side:

- Electronic Data Systems reported $20 million in sales -- all from facilities management -- for its latest quarter. The EDS Chairman, enigmatic Ross Perot, has bought his way into the ailing Wall Street brokerage house of duPont, Glore Forgan, and EDS has a contract to take over DGF's back-office operations. This could be a beachhead into the brokerage industry similar to that won by Perot in data processing for health insurance/Medicare.

- Computer Technology, the much-abused LTV subsidiary sold to University Computing Corp., has noted a growth in profitability in its latest quarterly statement, and also announced that non-LTV companies were growing in importance as part of its business mix.

- Traditional computer service outfits and corporate "spinoffs" are adding FM to their catalog of customer services. Latest on the list is Grumman Data Systems. Already established are Bradford Computer and Systems, Computing and Software, and Computer Sciences Corp.

Various prognosticators in and around the FM "industry" estimate that sales, revenues, contracts, or "whatever" run at $200 million to $400 million now and will quickly zoom to the multi-billion-dollar level. EDP/IR questions this. It sounds too much like 1968 when International Data Corporation, our publisher, cautioned some of its research clients that fundamental economics would cause the downfall of many promising time-sharing companies. Thus, we believe that a look at fundamentals is once again in order.

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Will the real Facilities Management please stand up

The term "facilities management" (FM) has been around for quite some time, but just about everyone who uses it has his own special definition or idea as to what it is. So the trouble with talking about the FM market is that even a slight change in definition can add or subtract several hundred million dollars of present or projected business. Thus, we start this report with that most boring of boring beginnings -- a definition. And we will look at FM from the user's point of view:

> Facilities management -- The practice of providing total on-site data processing to a user. It includes hardware selection, software development, and day-to-day operation under a long-term contract either for a fixed fee or based on provisions for expansion of data processing services according to an established formula.

The all-inclusiveness of FM service is the key. Many companies provide portions of FM service, even up to delivering turn-key systems. But the facilities manager takes complete charge of the operation and the customer pays for this service with one monthly check. The move to facilities management is usually a top management decision, even though the contract may be small (one company is talking to some System/3 users) or huge (such as a Federal Government facility or a statewide hospital insurance operation).

The U.S. Government was probably the first facilities management customer, but called this service O&M for Operation and Maintenance. For several reasons, the Government market is different from commercial FM. Applications are not standardized, contracts involve a lot of money and often come up for bids each year, and suppliers may concentrate almost exclusively on this particular market.

Companies in many different industries -- from distilling to stock trading -- use facilities management, but certain fields are most popular. These are Medicare claims processing, insurance, credit card and other banking applications. Also, big contracts exist in industries such as aerospace mainly because that's where the FM spinouts came from in the first place.

Facilities management, in many cases, is just a hair's-breath away from highly competitice, non-FM services. Indeed, by simply rewriting contracts and changing the scope of his offering a bit, the facilities manager could easily cross the line. Similarly, it would be relatively simple for a company now creating turn-key systems -- but not operating them on a long-term basis -- to move into FM.

So if the definition of facilities management is hazy today, there's every chance it will be even more muddled in years to come. As a concept, FM has certain advantages, but it also places several restraints on the customer (see opposite page). As we examine the companies who say they are facilities managers, we quickly see that FM, as an "industry," in the main is just an attempt to describe part of something that already exists.

Where FM suppliers come from

Facilities management is the opposite of presidential races. Many claim they're into it, but few actually are. This, at least, is the impression one gets from talking to bona fide FM suppliers. Even these tend to have a small handful of customers, and few of them take in so much as $5 million in annual revenues from facilities management.

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FACILITIES MANAGEMENT HAS SOMETHING TO OFFER . . .

In theory, facilities managers have a lot to offer the user. Among other things, they provide benefits such as these:

Expertise in particular areas. A facilities manager may get an edge over both user and his competitors by specializing in certain industries or application areas, such as banking, financial, or insurance.

Proprietary software. The more standardized the application, the more likely the FM is to develop a proprietary package and modify it for each user -- at a fraction of the original cost.

Sharing computers. Frequently when the FM takes over one customer's facility, it will use excess computer time for other customers. Facilities managers like to talk about Grosch's law -- processing is cheaper on larger machines.

Efficient use of skills. Top-flight systems people can be shipped into an installation during the first phases of systems development and implementation. They then move on to other clients, leaving behind only the personnel needed for day-to-day operation.

Lower turnover, better people. FMs claim these two advantages, both because of energetic recruiting and because there are "career paths" within the facilities management company.

Budget control for the user. The long-term FM contracts give the user a guarantee of future data processing costs. And the FM bears the risk of cost overruns and delays.

. . . BUT IT ALSO HAS SOME DRAWBACKS!!!

There are drawbacks to facilities management, however. Listed below are some of the things users sacrifice when they opt to put their data processing in the hands of an outside manager:

Loss of control, security of company information. Will users trust the facilities manager with their books? Especially when the FM may be affiliated with or serving competitors?

Isolation from DP operations. Facilities management could be a false security blanket, especially if it gives corporate executives an excuse for their ignorance.

Trouble! The facilities manager may fold.

Working out a contract is tricky. It may be a five-year committment, and the user better have all the necessary safeguards . . . including a way to keep the show running if and when the FM company pulls out.

Morale. The DP manager, DP personnel, and other computer users in the company may resent the takeover -- especially if they get laid off or transferred. (FMs say good people have nothing to worry about.)

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Companies have slipped into facilities management in three ways:

- Started from scratch. This is more or less what Electronic Data Systems did, and a few other hopefuls have followed suit.

- Fortune 500 spinout. Computer Technology was once upon a time LTV's computer facility. Aircraft-maker Grumman also spun out its DP operations and started advertising facilities management. Other FM's have equity ties with customers (see EDP/IR Dec. 31,1970).

- Diversified from other computer services. This is the most common source of competition. Computing and Software, for instance, has spread into facilities management, and to a lesser extent so have Systems Development Corp., URS Systems, and Leasco. These and more obscure participants capitalize on their customer contacts and experience, especially in particular applications areas.

Whatever their origin, most FMs provide other computer services. For those who trim their client's hardware costs by utilizing his excess computer capacity, service bureau-type operations are part and parcel of the facilities management game. And often facilities management is just one of many software and service products. However, three companies described below all concentrate in the FM area, including the largest facilities manager, EDS.

Electronic Data Systems, the pioneer in commercial facilities management, was started by what Fortune called "The Fastest, Richest Texan Ever." It concentrates on certain areas with standardized applications -- mainly the insurance industry and Medicare claims processing for Blue Shield companies. Ross Perot's modus operandi is to move his super-programmers from site to site, pounding the system in shape on the basis of experience and polished software routines. In 1970 this FM leader both signed a facilities management contract with the Wall Street broker Dupont, Glore Forgan & Co. and bailed out the same with a $10 million short-term loan.

Computer Technology, Inc. and Service Technology Corp. are two other Texas based facilities management companies, both originally part of Ling-Temco-Vought (EDP/IR Feb. 4, 1970). CTI, now 71% owned by University Computing, operates in the commercial area and STC, an LTV subsidiary, is exclusively government-oriented. (The latter received an estimated $15-20M in 1970 billings from its NASA O&M contracts.) Computer Technology took some write-offs during 1970 -- blamed on an overenthusiastic former management -- but is now in the black. Roughly 80% of its revenues still come from the LTV companies, but it also has customers in banking, Medicare claims processing, and other areas.

Computer software and services companies are "naturals" for facilities management. For big enterprises, this may be one more item to round up the product line. For smaller firms, other types of business provide a good lead into facilities management, both from the point of view of developing expertise and of establishing themselves as a viable, reliable organization.

Computing and Software, one of the largest software houses, has been pushing its computerized business services. These typically depend on a data base. A very small part of C&S's total revenues of about $90 million come from commercial facilities management, although the company has significant O&M contracts with the Defense Department. Two of its clients are Canadian stock exchanges. Even though

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C&S is not now deeply involved in the FM area, it seems to EDP/IR that its extensive user contacts could easily lead to more of this business, if the company is interested.

Computer Sciences Corp. gleans most of its $109M in sales from contract services, and the majority of that from the Federal Government. It does extensive O&M for various Defense Agencies and the AEC. One contract to run the AEC's Hanford Project computer facility in Washington State was renewed last August. The extension is valued at an estimated $18M over the five-year period, and requires about 230 CSC people. CSC also directly or through partly owned subsidiaries is attempting to market its proprietary services, such as Infonet.

And then there are the computer software heavyweights -- URS Systems, System Development Corporation, and Informatics -- with sideline operations in facilities management. URS provides consulting and systems design in both computer and non-computer fields; SDC develops custom software and systems, mostly for the Federal Government, and Informatics markets proprietary software, custom services and processing services as well as operating a NASA information facility through Informatics/Tisco. Leasco diversified from leasing into custom software, and now is edging into FM.

The companies described below are small, young organizations, with substantial involvement in facilities management, but only one of them -- ICM -- concentrates exclusively in that area. This roster makes up only a partial list of market participants.

Bradford Computer & Systems, with $8.5 million in 1970 sales, offers systems design as well as FM services. One of its FM clients, International Paper, owns about 7% of Bradford's stock. The other, Marine Midland, is involved in a joint venture with Bradford to provide shareholder accounting services for Marine's corporate customers. Another of Bradford's joint ventures is similar to the Marine Midland project -- it handles shareholder accounting for mutual funds -- but it is not a facilities management enterprise. Mobil Oil is another Bradford shareholder.

National Sharedata claims an annual sales rate of $5 million from its long-term contracts. This Texas-based company specializes in providing FM to banks in the Southwest, and it also consults for a Federal Reserve bank and runs education courses for the American Banking Association. The company says its FM contracts give it a "base of operations to market Automated Customer Services to other businesses for the mutual benefit of both the bank and Sharedata."

International Computer Management (ICM) and Raam Information Services are two FM firms in New York City. ICM has eight clients in New York City, and plans to set up offices in Chicago and Los Angeles. Raam Information Services is indirectly owned by the Fortune 500 company, Rapid-American, and some of its FM revenues come from within the corporate family.

Value added! Leverage! Economies of scale! Profits?

As the above profiles indicate, it isn't hard to get into the facilities management market. For corporate computer center spinoffs, it is a good way to keep a DP operation busy during a slow economy. The large software and services suppliers can try for more mileage from their names, proprietary software, and perhaps specialized data bases by marketing FM for certain types of customer.

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And the pioneer FM companies have advantages. They already have the guaranteed revenue based of three- and five-year contracts. And with luck, they have established a reputation, at least in certain industry circles where company presidents might recommend them to trade association buddies. Also, there should be several areas -- with standard applications and perhaps a common data base -- in which the FM will have accumulated programs and knowledge. But even with business booming, there is the question of profits.

A facilities manager might double his sales base tomorrow by signing on one or two big customers. But as the situation becomes more competitive, a larger and larger portion of revenue is money that simply must be handed over to the hardware manufacturer, as rental, or paid to the staff, now replete with DP personnel from the new client's installation.

Even if the FM supplier saves on staff, cuts down hardware costs by sharing computers or returning excess hardware, and drives a bargain on supplies, he will inevitably have a high percentage of every contract dollar committed before he ever sees. Today, research by IDC indicates that the "average" computer user spends 40% of his DP budget for hardware and 47% for staff salaries. Of the remainder, half goes for supplies and the other half for outside software, services, and education.

The last 6.5% mentioned above, and some of the 47% spent on salaries are available for the facilities manager to squeeze for profits. But in the salary area there really isn't too much room because even if the number of people is reduced, the FM almost by definition will be using more qualified (and therefore more highly paid) personnel to do the job.

What lies ahead?

Facilities management is a potential new force in the computer industry; it is not at present a new factor. Indeed, its very existence is based on saving dollars for the user and, thus, it will serve if anything to reduce the amount of user spending. But it can represent new reported revenue to the industry since dollars that would have been paid directly to operational personnel will now show up as having been channeled through a company in the industry.

There is potential "value added" by facilities managers through the concentration of energy. Software development can be spread among many customers, and each of them will pay more than their proportionate share if the FM company is successful. But the trend already seems to be toward an on-line operation . . . toward providing a computer service that by any other name would be called time sharing or remote-batch operation.

ICL'S NEWEST COMPUTERS INTERMIX TECHNOLOGIES, COMPETE WITH SYSTEM/370

The British aren't really coming into the U.S. computer market . . . yet. But in a way, when ICL this week announced its new family of computers at several points around the world -- including the United States -- it seemed to be giving notice that it should not be counted out of the growing worldwide computer marketplace.

As the largest non-U.S.-based computer manufacturer, ICL has an installed base of about $860 million, according to estimates by International Data Corporation, publisher of EDP/IR. And with 1970 shipments in the $300 million range, ICL is running a close race with Honeywell as Number Two in the non-U.S. business.

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The new S series of computers in ICL's 1900 family give it processors that compare favorably with IBM's System/370 all the way up to the Model 165. ICL also announced enhancements to its smallest computer -- 1901A -- so that it can compete with the HIS 58 and IBM System/3 for small business or remote job entry applications. Inside the new equipment, ICL has gone even further than IBM in mixing technologies used for memory:

- The 1902S and 1903S -- which rent in the range of $8,000 to $30,000 per month -- have a traditional core memory with access times of 3 microseconds and 1.5 microseconds respectively for 24-bit words.

- The 1904S -- with typical system rentals in the $25,000 to $50,000 per month range -- has a semiconductor memory that cycles a 24-bit word in 300 nanoseconds. This is an advanced application of dynamic MOS (metal oxide semiconductor) circuitry and uses chips manufactured by Cogar Corp.

- The 1906S -- largest of the new systems with rentals in the $50,000 to $150,000 per month range -- has a plated-wire memory. Manufactured by Plessey in the U.K.,this memory technique allows up to 524K words of 48 bits each to be cycled in 300 nanoseconds, or twice as rapidly as with the 1904S.

The entire family is upward and downward compatible within itself as well as with members of the A series. Indeed, this has been true of the 1900 series since its original announcement in 1964. This characteristic is particularly advantageous in more remote areas of the world, ICL says, since a user with a 1904A or S could rely on a 1902A down the road to get his job done -- although much more slowly, of course -- in the event of machine malfunction.

The intermixing of technologies appears to be an attempt to take optimum advantage of the resources that are available to ICL. There are definitely problems in such areas as engineering and testing when different techniques are used for memory. And ICL is hardly trying to make a splash -- as IBM was accused of when it announced semiconductor memory with the 370/145 -- because the details of these memories were treated casually in the announcement material. Thus, ICL likely acquired several different groups of specialists through the mergers in which it was formed (EDP/IR Mar.29,1968) and has decided to take advantage of their abilities.

ICL is selling in the U.S. It has a large OEM group, and along with the announcement of the S series it disclosed that it has signed a $2 million contract with Farrington for about 100 pneumatic transports for handling paper and card stock documents. Farrington will use these in a document reading system to be introduced about june of this year. ICL estimates that the total sales value of these Farrington 7000 readers will be about $10 million.

The primary marketing thrust in this country, however, is to multinational companies that operate computers around the world. ICL reports that its 1900 computers -- after insertion of a simple instruction card -- readily compile and run Cobol programs prepared for an IBM/360. So it feels that, even if it can't get the U.S. home office business, it has a good chance of offering compatible equipment that will allow worldwide use of company-developed programs.

There is also the chance, of course, that ICL might decide to enter the U.S. market in conjunction with a U.S.-based manufacturer . . . offering equipment at

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the lower end that can communicate with giant central processors. ICL does belong to "The Club" -- Multinational Data Ltd., the joint research company set up by ICL, Control Data, and CII of France. This terminology was used by IBM in its countersuit against Control Data filed last week. And in its most recent annual report, ICL says that "for at least two years we have had collaborative as well as commercial links with Control Data Corporation." Maybe the British are coming!

NEW REGISTRATIONS BY COMPUTER COMPANIES

[Listed below are brief descriptions of proposed security offerings, from firms in the data processing field, that are currently in registration with the Securities and Exchange Commission. The preliminary prospectus for any issue may be obtained from the underwriter.]

HONEYWELL, INC.	Honeywell Inc., 2701 Fourth Ave., South, Minneapolis, Minn. 55408 on April 1, filed 281,250 outstanding shares of common. These shares are part of the 1,500,000 Honeywell shares received by General Electric in connection with the merger. They may be offered for sale from time to time by General Electric.
INFORMATION INT'L, INC.	Information International, Inc., 12435 W. Olympic Blvd., Los Angeles 90064 which is engaged in developing computer-based electronic-optical systems, on March 29, filed 625,000 outstanding common. The selling stockholder is the board chairman and holder of 48.1% of the outstanding common. Putnam, Coffin, Doolittle, Newburger Division of Advest Co. will head a group of dealers handling the exchange.
PERTEC CORP.	Pertec Corporation, 9600 Irondale Ave., Chatsworth, Calif. 91311, which manufactures data systems, on March 30, registered 416,220 shares of common stock. 200,000 are being offered by the company and 216,220 (outstanding) by the holders. The proceeds will be used to repay loans ($2,065,000) and for general corporate purposes.
PUBLISHING COMPUTER SERVICE, INC.	Publishing Computer Service, Inc., which provides data processing services primarily to the publishing industry, on March 30, filed 200,000 common. The proceeds, at $5 per share, will be used to open two new sales and service offices and for general corporate purposes. The underwriter will be specified later.
STORAGE TECHNOLOGY CORP.	Storage Technology Corporation, 2270 South 88th St., Louisville, Col. 80027, a peripheral equipment manufacturer, on March 30 filed 375,000 common. The proceeds, at a maximum price of $13 per share, will be used for product development and general corporate purposes. The underwriter will be C.E. Unterberg, Towbin Co. at 61 Broadway, New York, New York 10006.
ZVR SYSTEMS, INC.	ZVR Systems, Inc., 280 Park Ave., New York 10017, a software and services firm, on March 31, filed 70,000 common. The proceeds, at $5 per share maximum, will be used for expansion of marketing activities and other corporate purposes. The underwriter will be Chartered New England Corp., 90 Broad St., New York, New York 10004.

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"THE GRAY SHEET" MAY 14,1971 • VOL.6,NO.13 P.J.McGOVERN,EDITOR

Customer loyalty study

LONG-RANGE OUTLOOK INDICATES FEWER USER DEFECTIONS AS MAINFRAME MANUFACTURERS CONCENTRATE ON NEW PRODUCT LINES

For the first time in the computer industry since 1966, users know what the product choices are and the battle royal for customer loyalty is shaping up.

Then, IBM was beginning to make volume deliveries of its new System/360, Honeywell was challenging the 1401 customer base with its H-200, and the first Customer Loyalty Study conducted by EDP Industry Report indicated that "IBM, Univac have net loss of customers" but that IBM's "loyalty ratio" was 93%.

Today, IBM has announced and begun to deliver System/370, an enhanced System/3, and the 360/22 with which to keep its customers happy; RCA has countered with its 2, 3, 6, and 7; and every other major mainframe manufacturer has introduced new families or brought out major improved models within its existing line. And all this came at a time when budgets were being carefully watched and new computers were easy to postpone.

Thus, EDP/IR considers it extremely important this year to measure computer users' loyalty to their mainframe supplier, and the fifth of our Customer Loyalty Studies has just been completed (see summary profile, page 2). For the first time this year, we were able to study what actually happened during 1970 as well as what customers report will happen during the next couple of years. The study of U.S. customers receiving new computers shows:

- Four mainframe manufacturers had relatively loyal customers during 1970. IBM and Burroughs were tied, overall, at 80%, with IBM even stronger among 360 users; NCR, with 77% loyalty and Honeywell, with 73% weren't far behind.

- The other manufacturers were really churning accounts. RCA had a loyalty rating of only 48%, with Control Data and Univac netting only 43% of their customers who took deliveries of new equipment. Two of these -- CDC and RCA -- had offsetting competitive gains of 114% and 33% respectively, with only Univac joining IBM in a loss.

- For this year and beyond, all manufacturers can look forward to loyal customers, according to the study. Upgrade intentions right now range from a low of 70% for Univac to a high of 87% for Burroughs. This, of course, doesn't measure the final competitive pressures that will be brought to bear as actual delivery dates approach.

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CUSTOMER LOYALTY STUDY: SUMMARY PROFILE

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	(1) # Customers Gained From Competitors		(2) # Customers Lost To Competitors		(3) # Customers Re-Ordering From Vendor		% Loyal (3) / (2)+(3)		% Competitive Gain or Loss (1) - (2) / (2) + (3)		New Sites	
	1970	1971+	1970	1971+	1970	1971+	1970	1971+	1970	1971+	1970	
BUR	44	12	14	5	57	34	80%	87%	+ 42%	+ 18%	18	4%
CDC	24	6	8	2	6	7	43%	78%	+114%	+ 44%	8	<2%
GE	13	4	10	3	11	2	52%	**	+ 14%	**	5	1%
HON	49	9	30	10	80	35	73%	78%	+ 17%	- 2%	29	7%
IBM	88	32	222	67	907	290	80%	81%	- 12%	- 10%	262	59%
NCR	86	22	25	10	83	24	77%	71%	+ 56%	+ 35%	79	18%
RCA	28	8	17	7	16	18	48%	72%	+ 33%	+ 4%	2	<1%
UNV	35	10	48	12	37	28	43%	70%	- 15%	- 5%	35	8%
OTH	21	13	14	0	10	2	42%	**	+ 21%	**	8	<2%
	388	116	388	116	1207	440	76%	79%			446	100%

** The size of the 1971+ sample -- 556 sites -- while giving a good indication of loyalty among most manufacturers, is so small for GE and OTHER subsets that a difference of one unit would produce significant percentage changes.

NOTES: In each major column (except for the New Site data shown for 1970) there is 1) first a column for what actually happened in 1970 according to the sample, 2) then a column for what users say they are going to do during 1971 and later (indicated by 1971+).

The numbers in the first three major columns give site data only for the 1595 sites in the 1970 sample and the 556 sites for 1971 and beyond. Mixed sites (with mainframes from more than one manufacturer) are not included in either sample.

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Conditions and restraints

To measure "brand loyalty" in the computer business, EDP/IR's research staff analyzed reports from computer users who, according to the Domestic Installation Data File maintained by International Data Corporation, our publisher, took delivery of a system during 1970. We also analyzed reports of systems ordered for 1971 or later delivery. Also, we conducted a special survey of user intentions. Results from 1595 user sites for 1970, 556 for 1971 and beyond, are summarized across the page. The table also shows the formulas for calculating loyalty and competitive gain or loss and summarizes reports from 446 new sites in 1970.

In analyzing the results of this study, the reader is asked to consider very carefully the restraints and conditions involved:

- Only U.S. sites are studied. If foreign sites were included, companies strong in European markets -- Univac, Control Data, and the GE component of HIS -- might show up in a better light.

- The figures exclude sites which, at the beginning of 1970, had mainframes installed by more than one manufacturer or which installed (or had on order) equipment from more than one manufacturer.

- First-time users are reported but not analyzed, even though many of them might be considered "loyal" customers on the basis of their previous EAM or bookkeeping equipment.

- All figures presented are based on number of sites. Naturally, for example, Univac would be more severely impacted by an 1108 user switching to an IBM/370 than it would by a 9200 user moving to System/3.

IBM's soft underbelly

Throughout the history of the computer industry, IBM has been the primary target for most other mainframers as they built up their competitive thrust. It is only natural, then, that EDP/IR's loyalty studies since 1966 have shown a gradual erosion in loyalty for IBM customers from a high of 93% to the 1970 measurement of 80%. The 81% figure that shows up for 1971 and beyond, therefore, could be very significant . . . proof that IBM indeed has renewed its marketing vigor.

And it should be remembered that, even through the five-year decline in loyalty, IBM's figure has continually outshone that of the other manufacturers as a composit. Non-IBM loyalty ratings, as measured by EDP/IR, have moved from below 60% to the 64% calculated for 1970 and the 74% estimated for the early 1970s.

Our analysis of individual models involved shows that the drop in IBM's loyalty is primarily attributible to stiff competition at the lower end of the product line, with older -- often customer-owned -- second-generation 1400s and 7000s, and among the relatively unsupported 360/20s. The current study shows that during 1970 only 70% of older equipment users were loyal to IBM vs. 84% of System/360 users. And for 1971 and later replacements, only 38% of second-generation users plan to remain loyal, vs. 90% of IBM's third-generation users.

Obviously, this is an area where IBM can stem much of the tide if it desires, and indications are that it desires. It looks as if the 360/22 and the enhanced System/3 are moves in this direction, especially since a significant number of 360/20 users -- 45% of those for 1971 -- are moving "up" to System/3.

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The increasingly loyal opposition

The difficulty in retaining long-standing users of out-dated equipment is not felt solely by IBM. Indeed, many of its competitive gains have come from second-generation Honeywell, NCR, and Univac customers who are attracted by the prospect of being a member of the IBM family. In the section that follows, therefore, we review the strengths and weaknesses of the other manufacturers that are pointed up in the study. GE is treated separately, since it wasn't part of HIS for all of 1970.

Burroughs, despite intermittent rumors of possible defections, retains its hold on the most loyal non-IBM users. The 80% figure for 1970 and the 87% for 1971 look good in any comparison. Only the B200 series served as the source for any real gain by other manufacturers, although several 5500 users were lost to IBM in the hours before Burroughs introduced its 700 series. The financial industry (see page 5) is a very loyal sector for both IBM and non-IBM users, and Burroughs strengths here has served it well. The B2500 and 3500 attracted most of the new users to the Burroughs fold, and only 45% came from IBM. Burroughs competitive gain of 42% was third highest in the industry.

Control Data led the pack in competitive gains, although most of this new business is based on conversions from second-generation IBM computers to 3150s at several universities. Most upgrading 6600 users were going to the 7600, but one 6400 user reports a 370/145 on order. CDC's low loyalty figure probably reflects its reliance on government and university contracts, which normally require competitive bidding.

GE users may now select from the Honeywell menu and not feel disloyal, but little movement in this direction has occured in the past. The low loyalty and competitive gain figures for 1970 may indicate confusion or concern over the then-pending Honeywell-GE merger. The HIS 6000 announcement should hold down losses in the large computer category, but one user is replacing a 635 with a 370/155.

Honeywell's 110 and 115 proved successful in capturing several disenchanted 360/20 users, and the same machines are attractive entry points for new users. In the reverse of the IBM pattern, Honeywell seemed to have trouble with its middle-of-the-line 1200, 1250, and 2200 users before it introduced the 1015 and 2015. In the Honeywell case, as with others, defections to the IBM/370 were noted.

NCR's 56% net gain, second highest in the industry, was to a large extent based on disloyal 360/20 users moving over to the Century line. Several Univac customers also succumbed. The effects of NCR's new entries -- the 50 and 300 -- remain to be seen, and many C200 users indicated doubt about future plans. Of significance for the future is NCR's new user site penetration -- 18% of the total.

RCA has set its sights on attracting precisely those IBM users who have historically been most loyal -- the 30, 40, and 50 users. The company publicized some "name" accounts that were supposedly swooning its new, numbered machines. It turns out, however, that several of these were customers sold on the advantages of the Spectra series more than a year ago. Interestingly, only 57% of the sites gained by RCA in 1970 were made at the expense of IBM, compared with 68% for Honeywell, 83% for Univac, and 87% for NCR. Also, RCA 301 and 70/35 users represented in the study were relatively disloyal, with more than half of each category opting for a competitive product. With a competitive gain of only 4% indicated for 1971 and beyond, and with little in its current product line to attract first-time users, RCA may be further from Number Two than it thinks unless its salesmen change things.

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Univac, in 1971, is finally approaching the end of a long seige of competitive losses. From a net loss of 52% in 1966, the company -- helped by success with its 9000 line -- looks forward to only a 5% net loss in sites this year, according to the study. And its loyalty ratio increases significantly from only 43% in 1970 to 70% at the present. Some 88% of Univac's converts to its 9000 computers have come from IBM, and an observer wonders if the 1700 keypunch salesman didn't have a hand in this. Its one trouble spot, now, seems to be at the small end. Just as 360/20 users want to "upgrade" to System/3, so do some 9200 customers.

Other vendors -- primarily DEC and XDS -- have not been examined in previous loyalty studies but were examined this year. In 1970, only 42% remained loyal as university customers upgraded to a general-purpose computer. The 1971 sample, too small for extrapolation, shows 13 customers gained by Others, none lost, and two re-ordering. One interesting case involves a service bureau that plans to replace a 360/65 with a PDP-10. There seems to be renewed interest in this machine for time-sharing applications, and with the PDP-10i about to be announced, EDP/IR will be reporting on the situation before long.

Industry characteristics and trends

An added feature of this year's Customer Loyalty Study is the customer profile by industry, shown below in summary form. A few interesting trends can be spotted. Users in the financial and medical areas seem to be the most loyal -- whether or not they use IBM equipment. And the Federal Government has generally low loyalty. It is one of IBM's weakest areas, but apparently once the Federal customer decides to switch, he does so across the board -- only 23% of non-IBM users remain loyal.

The non-IBM manufacturers have had extremely good loyalty at the local government level, and seem to do better than average with utilities (much of this, however, reflects RCA's entrenchment with Bell System operating companies). Durable products manufacturers with non-IBM equipment are apparently getting more selective and often are apt to opt for a change.

CUSTOMER LOYALTY STUDY: INDUSTRY PROFILE, 1970

	SIC	IBM LOYALTY		NON-IBM LOYALTY	
Agriculture, Mining & Construction	01-17	22:4	85%	6:5	55%
Chemical & Petroleum Processing	20-31	168:35	83	44:17	72
Durable Product Manufacturing	19,32-39	165:41	80	43:41	51
Transport. & Utilities	40-49	46:9	84%	14:4	78%
Wholesale & Retail	50-59	91:21	81	26:17	60
Finance & Insurance	60-69	143:17	89	67:21	76
Non-Professional Services	70-79	11:4	73	9:5	64
Hospitals-Health	80	32:2	94%	15:6	71%
Colleges & Universities	82	69:40	63	5:12	29
Service Bureaus	89	73:16	82	41:16	72
Federal Government	91	15:6	71%	5:17	23%
State Government	92	18:4	82	6:5	54
Local Government	93	34:17	66	12:1	92
TOTAL		887:216	80%	293:167	64%

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GENERAL PURPOSE COMPUTER CENSUS

Counts in the General Purpose Digital Computer (Group A) Census, shown below, are based on the best information available to the International Data Corporation, but are estimates. Computer manufacturers, as a rule, do not directly supply this type of information, and it is only through the use of IDC's extensive data files and other information sources that such estimates are possible. The computers included in "Group A" comprise the bulk of digital computers in operation. They are byte or character oriented -- with the exception of large-scale scientific machines -- and are primarily programmed with higher-level languages. In addition to this Census, EDP/IR publishes a Dedicated Application Digital Computer (Group B) Census that includes minicomputers and specialized-purpose machines.

AS OF APRIL 1, 1971

NAME OF MANUFACTURER	COMPUTER MODEL	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS IN U.S.	NUMBER INSTALLATIONS OUTSIDE U.S.	TOTAL NUMBER INSTALLATIONS	TOTAL NUMBER UNFILLED ORDERS
Burroughs	205	$ 4,600	1/54	1	10	11	X
	220	$ 14,000	1/58	9	2	11	X
	B-100 Series	$ 3,300	8/64	13	6	19	X
	B-200 Series	$ 6,500	11/61	241	133	374	X
	B-300 Series	$ 8,000	7/65	510	98	608	X
	B-500	$ 3,800	11/68	325	272	597	65
	B-2500	$ 6,500	2/67	188	73	261	35
	B-3500	$ 14,700	5/67	316	160	476	105
	B-4500	$ 29,000	11/71	-	-	-	35
	B-5500	$ 33,500	3/63	136	39	175	X
	B-5700	$ 27,000	12/70	5	1	6	30
	B-6500	$ 70,000	11/69	16	14	30	X
	B-6700	$ 67,000	2/71	2	0	2	32
	B-7700	$120,000	2/72	-	-	-	3
	B-8500	$200,000	4/69	1	0	1	X
	Subtotal			1763	808	2571	305
Control Data Corp.	G-20	$ 19,600	4/61	6	10	16	X
	1604/A/B	$ 42,000	1/60	32	5	37	X
	31/3150	$ 10,500	12/64	109	54	163	10
	3170	$ 16,700	12/70	4	1	5	8
	3200	$ 14,000	5/64	61	45	106	X
	3300	$ 20,500	9/65	134	101	235	17
	3400	$ 23,700	11/64	4	12	16	X
	3500	$ 25,000	1/69	4	11	15	2
	3600	$ 48,000	6/63	26	19	45	X
	3800	$ 53,000	12/65	12	5	17	X
	6200	$ 39,000	11/70	3	0	3	3
	6400	$ 55,300	5/66	63	28	91	7
	6500	$ 65,500	12/67	16	3	19	3
	6600	$127,000	8/64	68	28	96	6
	6700	$137,000	7/70	3	0	3	3
	7600	$190,000	1/69	5	0	5	3
	Cyber-72	$ 25,000	3/72	-	-	-	NA
	Cyber-73	$ 50,000	3/72	-	-	-	NA
	Cyber-74	$100,000	3/72	-	-	-	NA
	Cyber-76	$200,000	3/72	-	-	-	NA
	Subtotals			550	322	872	62
Digital Equipment Corp.	PDP-6	$ 10,000	10/64	17	6	23	X
	PDP-10	$ 13,500	10/67	126	50	176	6
Friden	System-10	$ 1,400	10/70	18	0	18	45
Honeywell	G-5X Series	$ 1,400	1/66	55	1430	1485	150
	G-105	$ 1,350	3/69	19	51	70	16
	G-115	$ 2,500	4/66	270	1460	1730	80
	G-120	$ 3,200	1/70	17	80	97	32
	G-130	$ 4,400	10/69	3	66	69	18
	G-205	$ 2,900	6/64	5	0	5	X
	G-210	$ 16,000	3/60	22	0	22	X
	G-215	$ 6,000	9/63	7	0	7	X
	G-225/255	$ 8,500	4/61-10/67	140	23	163	X
	G-235/265	$ 14,500	4/64-10/65	100	19	119	X
	G-245-275	$ 18,000	10/69	2	1	3	X
	G-405/410	$ 7,200	2/68-11/69	29	3	32	2
	G-415/420	$ 7,600	5/64- 6/67	182	234	416	X
	G-425/430	$ 13,200	6/64- 6/69	64	80	144	X
	G-435/440	$ 14,800	9/65- 7/69	40	20	60	3
	G-615	$ 55,000	6/69	15	8	23	5
	G-625	$ 65,000	4/65	1	4	5	X
	G-635	$ 80,000	5/65	75	16	91	4
	G-645	$120,000	7/66	4	0	4	X
	G-6030/6040	$ 25,000	7/71- 3/72	-	-	-	NA
	G-6050/6060	$ 46,500	7/71- 3/72	-	-	-	NA
	G-6070/6080	$ 61,500	7/71- 3/72	-	-	-	NA
	H-110	$ 3,200	9/68	188	93	281	35
	H-115	$ 4,000	3/70	275	104	379	240
	H-115/2	$ 5,060	1/71	31	12	43	NA
	H-120	$ 5,000	1/66	695	390	1085	X
	H-125	$ 7,400	12/67	160	214	374	22
	H-200	$ 7,600	3/64	625	335	960	X
	H-1015	$ 8,400	4/71	-	-	-	NA
	H-12/1250	$ 10,500	2/66- 8/68	400	153	553	16
	H-2015	$ 12,800	2/71	3	0	3	NA
	H-2200	$ 19,600	1/66	115	77	192	6
	H-3200	$ 23,000	2/70	42	15	57	18
	H-4200	$ 28,500	9/68	25	7	32	4
	H-8200	$ 50,000	2/69	16	2	18	4
	H-400	$ 10,600	12/61	45	31	76	X
	H-1400	$ 14,000	1/64	4	6	10	X
	H-800	$ 26,000	12/60	57	13	70	X
	H-1800	$ 46,000	1/64	14	2	16	X
	Subtotals			3745	4949	8694	655

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AS OF APRIL 1, 1971

NAME OF MANUFACTURER	COMPUTER MODEL	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS IN U.S.	NUMBER OF INSTALLATIONS OUTSIDE U.S.	TOTAL NUMBER INSTALLATIONS	TOTAL NUMBER UNFILLED ORDERS
IBM	System-3/6	$ 1,015	12/70	360	40	400	900
	System-3/10	$ 1,400	1/70	2230	390	2,620	6500
	360/20	$ 4,200	12/65	8400	6210	14,610	700
	360/22	$ 5,600	7/71	-	-	-	NA
	360/25	$ 8,000	10/68	1850	1000	2,850	480
	360/30	$ 12,300	6/65	6700	3315	10,015	100
	370/135	$ 18,500	5/72	-	-	-	NA
	360/40	$ 22,000	5/65	2900	1800	4,700	160
	370/145	$ 22,500	8/71	-	-	-	1070
	360/44	$ 13,800	7/66	135	100	235	10
	360/50	$ 36,500	8/65	1310	570	1,880	110
	370/155	$ 48,000	2/71	9	0	9	855
	360/65	$ 69,000	11/65	660	195	855	50
	370/165	$ 90,000	4/71	-	-	-	325
	360/67	$138,000	6/66	58	8	66	X
	360/75	$ 84,400	1/66	53	22	75	X
	360/85	$155,000	10/69	15	4	19	3.
	360/9X	$150,000	11/67	13	4	17	X
	360/195	$232,000	3/71	1	0	1	15
	1130	$ 2,100	2/66	3390	1570	4,960	90
	305	$ 3,600	12/57	2	21	23	X
	650	$ 4,800	12/54	7	35	42	X
	1401	$ 6,200	9/60	1740	1660	3,400	X
	1401-G	$ 2,300	5/64	265	68	333	X
	1401-H	$ 1,300	6/67	78	20	98	X
	1410	$ 17,000	11/61	175	112	287	X
	1440	$ 4,100	4/63	600	485	1,085	X
	1460	$ 9,800	10/63	127	59	186	X
	1620	$ 4,000	9/60	424	250	674	X
	7010	$ 26,000	10/63	38	12	50	X
	7030	$160,000	5/61	5	2	7	X
	704	$ 32,000	12/55	6	4	10	X
	7040	$ 25,000	6/63	32	27	59	X
	7044	$ 36,500	6/63	30	21	51	X
	705	$ 38,000	1/56	19	10	29	X
	7070/74	$ 27,000	3/60- 2/61	171	56	227	X
	7080	$ 60,000	8/61	71	1	72	X
	7090	$ 63,500	6/60	28	26	54	X
	7094	$ 73,400	9/62	90	10	100	X
	7094-II	$ 79,400	4/64	24	0	24	X
	Subtotals			32,016	18,107	50,123	11,368
NCR	Century-50	$ 1,650	2/71	10	0	10	100
	Century-100	$ 2,600	9/68	1350	425	1775	300
	Century-200	$ 7,700	6/69	400	125	525	200
	Century-300	$ 20,000	2/72	-	-	-	20
	304	$ 10,000	1/60	15	2	17	X
	310	$ 1,000	5/61	8	0	8	X
	315	$ 7,000	5/62	425	300	725	X
	315-RMC	$ 9,000	9/65	125	50	175	X
	390	$ 800	5/61	325	490	815	X
	500	$ 1,000	10/65	1000	1700	2700	100
	Subtotal			3658	3092	6750	720
Philco	1000	$ 7,000	6/63	13	1	14	X
	210/211	$ 40,000	10/58	12	1	13	X
	212	$ 52,000	1/63	12	1	13	X
RCA	2	$ 14,600	7/71	-	-	-	38
	3	$ 19,600	10/71	-	-	-	30
	6	$ 29,900	10/71	-	-	-	20
	7	$ 40,100	10/71	-	-	-	16
	Spectra 70/15	$ 5,100	9/65	45	160	205	X
	Spectra 70/25	$ 7,900	9/65	15	73	88	X
	Spectra 70/35	$ 13,600	1/67	164	254	418	22
	Spectra 70/45	$ 23,100	11/65	324	220	544	30
	Spectra 70/46	$ 40,200	11/68	40	3	43	10
	Spectra 70/55	$ 41,600	11/66	21	18	39	5
	Spectra 70/60	$ 43,100	9/70	9	1	10	8
	Spectra 70/61	$ 55,000	3/71	1	0	1	5
	301	$ 9,500	2/61	334	23	357	X
	3301	$ 25,000	7/64	69	1	70	X
	501	$ 17,000	6/59	69	4	73	X
	601	$ 50,000	11/62	5	0	5	X
	Subtotal			1096	757	1853	184
Standard Computer Corp.	IC-4000	$ 9,000	9/68	16	0	16	X
	IC-6000	$ 16,000	5/67	9	0	9	X
	IC-7000	$ 17,000	6/69	18	0	18	1
Univac	I/II	$ 25,000	3/51-11/57	12	3	15	X
	III	$ 25,400	8/62	47	45	92	X
	SS-80/90	$ 8,000	8/58	66	71	137	X
	418-I/II	$ 13,700	6/63- 9/64	97	114	211	X
	418-III	$ 19,600	7/69	24	29	53	12
	491/492	$ 27,000	12/61	38	26	64	X
	494	$ 41,400	2/66	68	33	101	8
	1004	$ 1,900	2/63	1140	1525	2665	X
	1005	$ 2,550	4/66	760	188	948	X
	1050	$ 8,800	9/63	206	160	366	X
	1103/1105	$ 35,000	12/50-9/58	7	3	10	X
	1106	$ 40,000	12/69	25	26	51	30
	1107	$ 57,000	10/62	20	22	42	X
	1108	$ 68,000	9/65	143	96	239	17
	1110	$ 79,000	11/71	-	-	-	5
	9200	$ 1,700	6/67	1300	685	1985	205
	9300	$ 4,000	9/67	730	835	1565	150
	9400	$ 10,000	5/69	56	158	214	70
	LARC	$135,000	5/60	1	0	1	X
	Subtotal			4740	4019	8759	497
Xerox Data Systems	Sigma-5	$ 11,500	8/67	158	53	211	15
	Sigma-6	$ 20,000	11/70	9	1	10	10
	Sigma-7	$ 24,000	12/66	97	30	127	7
	Sigma-8	$ 19,000	9/71	-	-	-	NA
	Sigma-9	$ 44,000	9/71	-	-	-	4
	940	$ 24,000	4/66	41	8	49	X
	9300	$ 8,500	11/64	38	6	44	X
	Subtotal			343	98	441	36
	TOTALS			48,152	32,211	80,363	13,879

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NEW REGISTRATIONS BY COMPUTER COMPANIES

[Listed below are brief descriptions of proposed security offerings, from firms in the data processing field, that are currently in registration with the Securities and Exchange Commission. The preliminary prospectus for any issue may be obtained from the underwriter.]

AFCOA

Afcoa, 20801 Dearborn St., Chatsworth, Calif. 91311, which manufactures parts for computer disk, drum and tape memory and recording systems, on April 22 filed 200,000 common. The proceeds, at $30 per share maximum, will be used to secure larger facilities and purchase additional equipment for the company's Korean subsidiary, and for general corporate purposes. Also included in the statement are 82,600 shares common issuable pursuant to stock options. The underwriter will be Herbert Young & Co., Inc., 5 Hanover Sq., New York 10005.

ANSTAT, INC.

Anstat, Inc., 605 Third Ave., New York 10016, which offers packaged real-time DP services, primarily for distributors and manufacturers, on April 23 filed 160,000 common. The proceeds, at $9 per share maximum, will be used for program modification, computer rental, and other corporate purposes. Underwriters are headed by Agio Capital Corp., Two Broadway, New York 10004.

COMPUGRAPHIC CORP.

Compugraphic Corporation, 80 Industrial Way, Wilmington, Mass. 01887, which develops photocomposition machines and other equipment used in typesetting systems, on April 8 filed 250,000 common. Proceeds, at $17.625 per share maximum, will be used to reduce short-term bank loans. The underwriter will be Loeb, Rhoades & Co., 42 Wall Street, New York 10005.

COMPUTER AGE INDUSTRIES, INC.

Computer Age Industries, Inc., 8800 Arlington Blvd., Fairfax, Va. 22030, which provides investment advisory and management consulting services, on March 25 filed 1,250,000 common. Part will be sold by the company and part by stockholders. The proceeds (at $1 per share maximum) will be used to pay debts of a subsidiary (Richmond Power Equipment Co., Inc.) and for general corporate purposes. The underwriter will be Albert and Maguire Co., Inc., 2383-D Cottman Ave., Philadelphia 19149.

INDUSTRIAL NUCLEONICS CORP.

Industrial Nucleonics Corp., 650 Ackerman Rd., Columbus, Ohio 43202, which markets automation and management information systems, on April 20 filed $15M of convertible subordinated debentures, due 1991. The proceeds will be used primarily to finance expansion of its long-term lease program and for other corporate purposes. The underwriter will be William Blair & Company, 135 South LaSalle St., Chicago 60603.

ITT

International Telephone and Telegraph Corp., 320 Park Ave., New York 10022, on March 18, filed 1,000,000 shares cumulative convertible preferred stock. The proceeds, at $105 per share maximum, will be used for general corporate purposes. The underwriters will be Kuhn, Loeb & Co., 40 Wall Street and Lazard Freres & Co., 44 Wall Street, both of New York 10005.

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JUN 3 1971

EIDIP industry report

• THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" JUNE 2,1971 • VOL.6,NO. ~~13~~ 14 P.J.McGOVERN,EDITOR

The other shoe!!!

IN AN APPARENT MOVE TO STEM SUCCESS OF PLUG-COMPATIBLE INDEPENDENTS, IBM OPTS FOR FIXED-TERM LEASES WITH 8%-TO-16% OFF ON TAPES, DISKS, AND PRINTERS

One week after the close of the 1971 Spring Joint Computer Conference, and certainly overshadowing any pockets of emerging optimism the SJCC had stimulated, IBM made the most important computer industry news of 1971 . . . to date. As of June 1, 1971, the press release stated, IBM "will offer a fixed-term lease plan . . . at reductions in monthly rental of 8 percent for a 12-month lease and 16 percent for a 24-month lease."

> "The equipment covered by the new plan includes most of IBM's magnetic tape units, disk files, and printers, and the control units associated with them. Purchase prices on this equipment are being reduced by approximately 15%."

The word "most" in the statement translates to mean all CPU-connected 360 and 370 peripherals -- including 2319s, 3330s, and 3420 tape drives -- except card equipment. The new pricing also excludes any System/3 peripherals, all CPUs, all terminals and off-line equipment, and core. (See related story, page 5.)

Two major forces have been bothering IBM over the last several years: third-party leasing companies and plug-compatible equipment manufacturers. With System/370, and its associated heavy maintenance prices, IBM effectively guaranteed itself that third-party leasing companies would no longer impact its financial plans the way they did during 1968 and 1969.

But the growing thorn in IBM's side was the plug-compatible independent equipment manufacturer. Now, in THE PRICE CUT OF 1971, IBM has struck out at the other remaining force which it feels is inhibiting its ability to achieve planned and orderly growth of 15%+ per year. The independent peripheral companies have been left with a sharply curtailed market opportunity . . . largely limited to IBM customers who are either volume purchasers of peripherals, or who wish to make only month-by-month commitments. Neither type is to be found in quantity.

IBM, of course, says the "decision to offer fixed-term leases recognized that both IBM and its customers would benefit from a commitment to longer term installations of this equipment." No matter, the move will have impact . . . on IBM itself, on independent peripheral manufacturers, on the industry in general. Reactions to the move won't be in for several weeks, but EDP Industry Report presents its initial analysis in this issue. More will be forthcoming.

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Today's loss leader vs. tomorrow's loss

The equipment involved in THE PRICE CUT OF 1971 provides IBM about $80 million a month in rentals, and the probable annual loss to IBM is calculated by EDP/IR to be $75 million to $90 million at current levels, not counting overtime charges that will be eliminated for users who opt for a fixed-term lease. The dollars at stake for IBM, therefore, amount to about 1% of its 1970 revenue, 3.5% to 4% of 1970 pre-tax income. This figure may sound like disaster . . . or nothing . . . depending on the frame of reference.

From IBM's point of view, the total impact of the price cut is about the same -- 3% off on total system value -- similar to the reduction announced along with unbundling two years ago. At that time (EDP/IR July 14,1969), we pointed out that the "actions taken by IBM represent a price increase of at least 5%." Much of the expected new business from unbundling hasn't materialized, but at that time the price cut wasn't considered significant. This time, of course, the move is directed . . . it is obviously IBM's way of retaliating against the plug-compatible independents.

At yearend 1970, independent peripheral equipment manufacturers had replaced equipment that would have been producing IBM about $8 million a month, and by yearend 1971 -- especially with the increased shipments of 2314/2319-type disk drives -- this figure would have reached nearly $13 million a month.

The exact amount that IBM stands to lose from the price cut is not known. At yearend 1970, IBM's monthly rental from 360s in the U.S. was about $215 million, and EDP/IR estimates that roughly $80 million of this monthly rental represents equipment subject to conversion to a fixed-term lease. Thus, if all rental customers opted for a one-year lease, IBM's monthly loss would be $6.4 million; if all customers took a two-year lease, which is unlikely, IBM's loss would be $12.8 million a month. The actual loss will probably fall within these bounds, so it can be seen that, left unchecked, the independents would be costing IBM more than this amount by the end of 1971. Obviously, then, IBM has decided that some loss now is worth it to maintain customers and insure against future -- larger -- losses.

The growing independent thorn

For several years now, IBM has been watching the success of the plug-compatible independent peripheral companies, probably wondering what to do. Their success virtually coincided with the unbundling atmosphere created by IBM and was spurred by the economic downturn. Thus, by yearend 1970, independents had placed some 10% of all tape drives connected to IBM 360 systems, and represented 16% of the all-important rental base of tape drives.

The tape situation seems to have somewhat stabilized at that level, but the independents are coming on very strong in the disk drive area. At the end of 1970, the independents had installed about 13% of the 2311-type spindles on rental, and 9% of the 2314-type. But 1971 started off as a growth year in these areas and, left unchecked, the independents were expected to reach or exceed the 15% level for both types of disk drives by yearend.

It could be argued that most of this independent growth had come from the very large, sophisticated computer users and that continued penetration of the IBM base was unlikely. But IBM apparently couldn't take a chance. Next on the list for independents would be the vast number of middle-sized companies that represent the

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bulk of the computer users. This is the base already most loyal to IBM in mainframes (EDP/IR May 14,1971), and it's the base that IBM doesn't want to see heavily impacted. Any of these users who sign a fixed-term lease with IBM will not, in all liklihood, be fodder for independents; the cancellation clause in IBM's new lease is a healthy 21% of total lease commitment as penalty payments.

What about the independents?

The prime reason the independents have been successful has been the healthy 15% to 20% price break they had offered over comparable IBM products. But now, the price gap has been narrowed to the vanishing point, especially since "going independent" raises fears of potential maintenance problems to most users who haven't tried it. So, in order to continue, it would seem that the independents will once again have to reduce their prices.

Indeed, although most of the independents had not reacted as EDP/IR went to press, Ampex had announced that it plans to reduce prices "competitively," and although not officially announced as policy, CalComp had begun signing some large one-year leases at 10% below IBM's new prices.

This approach -- keeping prices below those of IBM -- is fairly certain to keep business coming in for the independents. But EDP/IR really wonders if the independents can afford to continue this practice. IBM obviously has more manufacturing economies than the independents, and even a cut to 10% below the new IBM level will have independents renting equipment at only 70% to 75% of what IBM was charging just a month ago. There can't be much profit left at this point.

One bright spot does emerge for the independents. With THE PRICE CUT OF 1971, IBM has changed the rules. It has stated that fixed-term leases are good, that change in the future will likely come more slowly, and that customers needn't worry about committing themselves for up to two years. Perhaps the independents can continue carrying their approach one step further than IBM and offer longer-term leases -- of three or more years -- at rates significantly under those charged by IBM. This would essentially give them full-payout leases and make the burden of financing a lease business easier, if nothing else.

But, overall, it looks to EDP/IR that the IBM announcement clearly signals to the independents what was likely in the cards anyway. The time for a drastic cut in production, especially of 2314-type spindles, was approaching. Concentration on the next evolutionary product is the order of the day. As 3330s reach volume delivery next year, remarketing of returns will keep sales forces busy.

What about the rest of the industry?

It seems to EDP/IR that THE PRICE CUT OF 1971 will be felt generally across the board in the computer hardware industry -- with the exception of the supplies area and terminals, which IBM did not include in the move. In general, the effect will be good for the user -- at least over the short term -- and negative for almost every other party involved.

Other mainframe makers will certainly have to consider the cut. Granted, a price cut of only 4% in rental value of a new system is not gigantic, but many of the other mainframers use price as part of their sales pitch, and every little 4% matters. With IBM user loyalty very high at the middle-of-the-line level, this certainly will tend to prevent further defections from the IBM customer base, since every fixed-term lease for peripherals will have a lock-in effect on systems.

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Leasing companies have been handed an automatic devaluation of their portfolios, for what little accounting difference that makes. More importantly, they have been given a way to satisfy their customers' add-on needs at lower outright cost. And at this point in time, IBM probably won't object to the purchase income . . . especially since it serves to guarantee upgrade business sometime hence.

New companies, or companies entering new areas such as core replacement (see following story) now have another factor to consider. IBM can no longer be treated as the Jolly Gray Giant with a widespread umbrella. Potential IBM reaction will have to be weighed in any business decision.

The heart of the matter

This move on IBM's part certainly should not have been unexpected. Several times in the past, and quite explicitly in a presentation to the New York Society of Security Analysts last November, EDP/IR and the International Data Corporation, its publisher, have warned about the danger of pushing IBM too far. "IBM can be expected to readily tolerate a threshold penetration by independents of up to 10% of its base but as the independents gain market share above that, we can expect additional announcements that will stiffen competition for the independents." Now, we have the announcement.

In making the announcement, in finally reacting, IBM has done nothing more than would be expected in such a competitive situation. The move could be interpreted by the Justice Department, however, as a distinct blow to competition . . . even though a price cut for a lease commitment is common industry practice. As in the past, EDP/IR does not wish to set itself up as judge. But initial reaction from legal sources indicate that IBM will have a very good argument in the likely event it is sued by one or more independents or that Justice includes this latest action in the suit that has been pending for more than two years.

Actually, independent legal action is considered unlikely, since IBM is geared up to handle lawsuits and could bury a small company in paper in the event of a suit. The legal expenses would be horrendous, and any action can take years to resolve. One lawyer tells EDP/IR that "the more I see of litigation in business matters, the less impressed I am that it is the answer to an economic situation. The independents are probably best advised to pull in their belts andspend their money competing in the marketplace."

Essentially, IBM was caught in a "damned if you do and damned if you don't" situation. In its recent action, it has proved that, as EDP/IR stated in this year's Review and Forecast issue (Mar.12,1971), "ever since the antitrust guns were leveled at IBM during the winter of 1968-69, a certain cautiousness had creeped into the company's outward attitude. Lawyers seemed to be running things. But . . . with the independent peripheral manufacturers stealing away business for economic reasons, IBM seemed to have reached a threshold of pain. Once again, the name of the game is all-out marketing."

So IBM reacted -- perhaps over-reacted. It dropped the other shoe. It is good for the computer user, but whether it will be good for the industry only time, user acceptance, and reaction from the independents and other industry factors will tell. It seems to EDP/IR, however, that THE PRICE CUT OF 1971 signals a folding of the umbrella and a shift to real price competition in the computer industry. Perhaps this good, perhaps not. But it clearly signals a change in the rules of the computer industry.

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INDEPENDENTS MOVE NEARER THE CPU WITH 360 CORE ADD-ON/REPLACEMENT OFFERINGS

The latest assault on IBM -- from independent plug-compatible core manufacturers -- is just picking up steam. Most competitors in this field, in face, used the SJCC as a launching pad for their entry. Now that IBM has reacted so strongly in other plug-compatible areas (see page 1), most of these companies are probably having strong second thoughts . . . wondering how far they can go in replacing 360/30, 40, and 50 core before IBM reacts.

To date only one company, Data Recall, has made much of an impact, with memory boxes at about 100 IBM user sites. Four others -- Ampex, Cambridge Memories, Fabri-Tek, and Information Control Corp. -- showed off their replacement memories at Spring Joint; another two companies -- Standard Memories and Electronic Memories -- have also announced they will enter the field.

These companies have their sights set on two similar but different types of customers for additional 360 memory:

1 -- Add-on. Only about half of today's 360 users have IBM's maximum allowable memory capacity. Many of them -- especially those with systems purchased from IBM or leased from a third party -- can fill their growth requirements for several years simply by adding more memory to their existing CPU. And some of the independent memory makers allow users to install more memory than IBM will supply.

2 -- Replacement. With users of rented 360s, the independents can suggest that all but the required minimum memory be returned to IBM and that the system be built back up to where it was or larger with independent memory boxes . . . at savings typically 20% off the rental charged by IBM, and with no overtime charges.

Potential market size

No matter who is asked, the market for 360-compatible core is pegged at several hundred million dollars. There's no doubt that it is large, and that even a small portion of it would be nice pickings for several independents. But to see how big the potential market is, EDP/IR has brought together the available facts. From the April 1, 1971 Computer Census, and from IBM specifications, we have:

Model	Number Installed	Minimum Memory	Maximum Memory
360/30	6,700	16K bytes	64K bytes
360/40	2,900	32K bytes	256K bytes
360/50	1,310	128K bytes	512K bytes

The minimum memory must be supplied by IBM on all rental machines and on any computers that receive IBM maintenance. For purposes of this analysis, we have assumed it is supplied by IBM. The maximum can be exceeded by some independents, but this has not been considered here. To determine how much memory is installed, and therefore how much is potentially available to independents, we examined the latest Domestic Computer Installation Data File maintained by International Data Corporation, publisher of EDP/IR. The scale of the following chart is in 16K-byte units of memory; the value is expressed in IBM purchase price.

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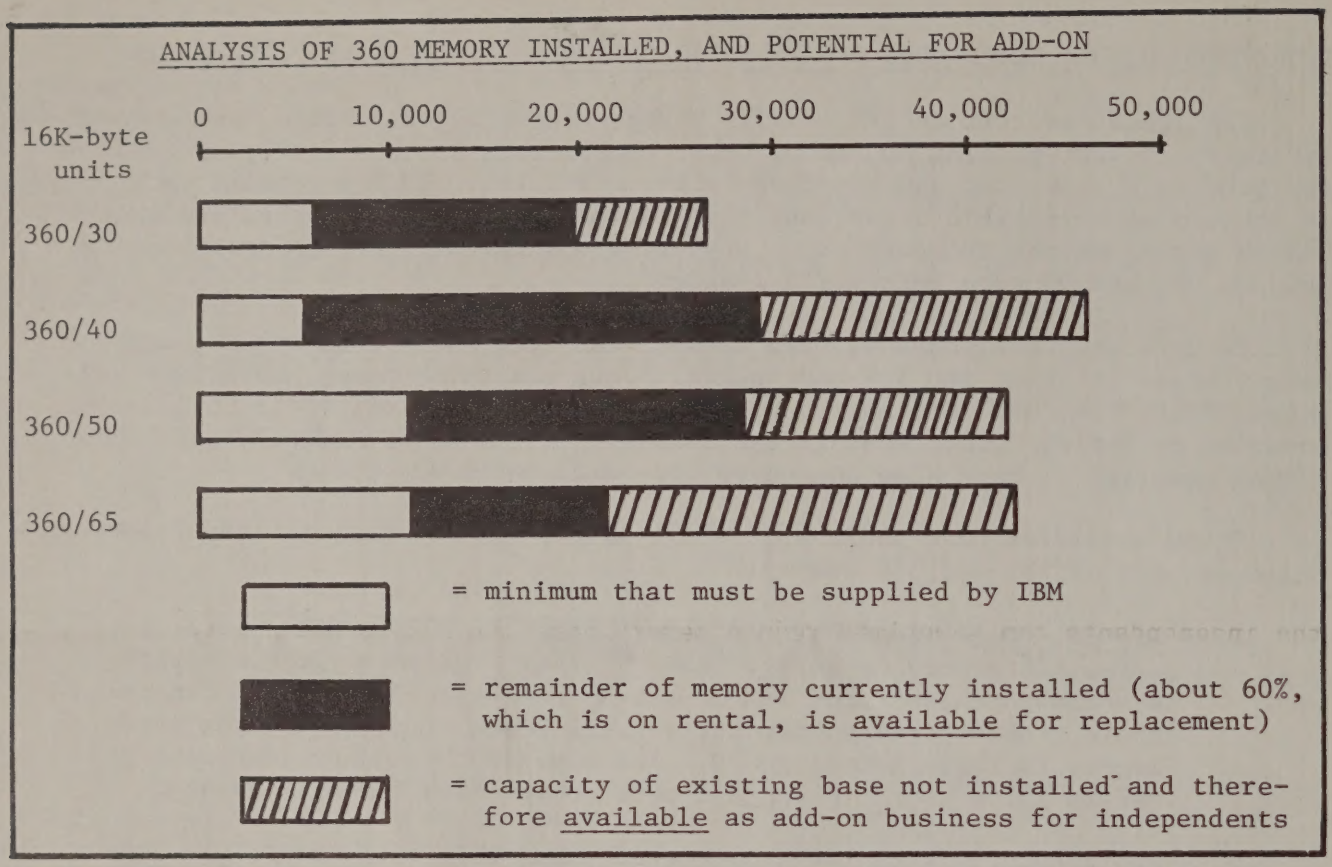
ANALYSIS OF 360 MEMORY INSTALLED, AND POTENTIAL FOR ADD-ON
16K-byte units
0
10,000
20,000
30,000
40,000
50,000
360/30
360/40
360/50
360/65
= minimum that must be supplied by IBM
= remainder of memory currently installed (about 60%, which is on rental, is available for replacement)
= capacity of existing base not installed and therefore available as add-on business for independents

Practical marketplace potential

As the chart shows, the potential for independents could be large. But how much of this independents will be able to win is still much in the air. For one thing, users may be wary of having independent equipment so near the heart of their data processing operation. If they are already using independent tape or disk drives, they may not want more than two vendors in the computer room, so would look only at core memory from their existing independent peripheral supplier.

There's always the question of resistance from IBM. Until just recently, there was a good argument that IBM salesmen are out to push 370s more than pamper 360s, and therefore might tacitly encourage the independent memory suppliers. The argument went that this locked the user to IBM and qualified him as a 370 customer a year or two hence. But after THE PRICE CUT OF 1971, it isn't clear that IBM is willing to concede any business to anyone.

One still promising area, although relatively unproven, is for add-on beyond IBM's stated maximum for a given model. Often, the easiest -- and cheapest -- way to improve computer performance is to add more memory. IBM specified its maximum memory limits more for marketing than for technical reasons, so today if, for example, a 40 user needs more than 262K he must go either to a 50 or move up to System/370.

But the independent core makers are offering a third alternative. Data Recall has already installed a 393K-byte memory on a 40, Fabritek has operated a 131K-byte memory on a 30, and several independents today offer to equip 360s with double the IBM maximum memory. Exceeding the IBM limit is particularly important to multiple 360 users, because, for example, 40 programs will run on 30s, if there is enough memory.

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Despite all the talk of replacing rental core or selling an extra memory box to the user who owns his computer, the prime target for independent memory makers is the third-party leasing company. The top dozen or so leasing companies own about 14% of all 360s in the U.S., and therefore don't take extensive marketing staffs to cover. These companies are accustomed to using independent equipment. Also, they had been trapped in the past by an IBM policy of not renting core boxes to computer owners. Now, they can rent from independents to give customers the up-grades they want.

The sales pitch

When the salesman for independent memory approaches the user, or the third-party leasing company, he has a strong argument. First, there is price. Independent units typically rent for about 20% less than what IBM charges. Even more important, there is no shift differential. On a 360/50 with 524K-bytes of memory, for example, the overtime charge is $5.68 an hour. This can add up to $2,000 per month for extremely heavy overtime use. And since the basic rental on the 524K unit is just under $10,000 a month, overtime can increase memory cost by 20%. So the independents can sometimes reduce memory costs by 35% to 45%, rather than the simple 20% in base price. One of the independents claims that a typical 360/50 user can save $4,220 a month -- 36% -- even when he retains the basic 131K from IBM.

And other advantages can be listed by the replacement core people: 1) Expansion beyone the IBM maximum; 2) Rental terms to 360 owners; 3) Better lease terms -- from two years to full payout -- with appropriate savings.

The competitors

Leading the independent plug-compatible core memory field is Data Recall, the first to install a 360 core replacement by almost a year, and first to install a core replacement that exceeds IBM's maximum. DR is strictly a manufacturing and R&D operation, relying on marketing agreements with Computer Investors Group and maintenance agreements with Honeywell.

Since competition has just started, Data Recall has some 95% to 98% of current installations. Its memories actually run at the same speed as those on the 370/155 and 165, and are electronically slowed down to run on 360s. Thus, it would seem that DR has a future marketing area all mapped out if IBM doesn't decide to close it in one way or another.

Fabri-Tek announced a 360/30 core replacement at Fall Joint last year, and followed at this year's Spring Joint with 40 and 50 replacements, as well as an over-maximum unit called the 30+. So far, the company has installed about ten 30 replacements and one 40. A 50 replacement is scheduled for early July. Like Ampex, Fabri-Tek got its start through OEM business, selling over $100 million of core memory products during the last decade. It has also been strong in the area of Large Core Store for 50s, 65s, and 67s. The company's customer list shows a strong emphasis on third-party lessors, and as it made its announcements recently it disclosed that National Computer Rental has agreed to place about $2 million of its 360 core modules. Maintenance for the Fabri-Tek memories is handled by Sorbus.

Ampex boasts of selling the basic core components to at least one of its competitors. Long a factor in the OEM memory market, core replacement should be a natural for the Culver City boys. They are also familiar with the independent peripheral market, and at last report were on the verge of selling their first

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package deal -- replacing IBM core, disks, and tape at one swoop. Thus Ampex can avoid two selling liabilities, the multi-vendor worry, and the maintenance worry, since both are part of its own organization. There are more than 30 Ampex end user salesmen, who have peddled just about 100 Large Core Store replacements; deliveries of normal core began in May, and total less than 10 so far. Ampex is planning to go beyond IBM-maximum shortly.

Cambridge Memories, which displayed a 131K byte unit at the Spring Joint, began delivery in April. It also makes end user memories for Varian 620 minicomputers. A small company, formed in 1968, CMI says it is shooting for $10 million to $20 million in 360 replacement business. So far, it has not announced units that exceed IBM maximum, but has admitted such developments are under way. Comma Corp. maintains CMI units in areas outside the company's Boston home base.

What will mother say?

IBM has maintained a predictable indifference to the independents since they have at most 125 core replacements in the field. What it will do as it loses more customers, though, is another question.

If the independents begin to take a sizeable percentage of IBM's memory rental business -- a very profitable business, by the way -- and IBM decides to do something about it, it has several courses open. First, IBM could simply increase the core maximum, blunting one of the independents' best spears. This course is doubtful, since it might foul the grand marketing strategy for the 370s. Second, it could decide to rent memory to 360 owners bringing the lessors back into the fold. This is a high policy decision, however, and would probably draw quite a bit of competition from the independents. Third, it could lower memory prices. IBM lowered prices only in response to significant losses to the independent disk and tape competitors. Unless there's a real threat to rental income, a price cut merely trims IBM's profit margins.

There is a theory among the independents' marketing men that IBM's main purpose now is to get 370s out the door replacing 360s. If true, this will keep the 360s from competing with the 370s on a rental basis. There will be a decreasing concern for holding the hands of 360 customers in the rush to push 370. Thus, according to the theory, IBM will be thankful to -- or at least tolerant of -- anyone who will keep 360 users satisfied and make it attractive to own a 360.

Prognosis

If these arguments have a familiar ring, say in statements from the tape and disk companies, it's worth remembering that IBM did not stomp on these independents until they had exceeded 10% of IBM's rental tape and disk base. The core builders' pulse -- and stock prices -- rise when the total $2.2 billion of 360 core is mentioned. But 40% is user or leasing company owned, and this is not subject to replacement. EDP/IR estimates that some $550 million could be added to this owned core, bringing it up to or over 360 system specs, and this is the least hazardous market for the core builders to tap. But the main chance -- replacement of $1.2 billion in IBM rental core and a new market of $800 million in potential add-on core at rented systems -- lies on dangerous ground. IBM's so-called 10% tolerance level is probably lower for rental core, and much independent penetration could bring swift reaction. Still, user and lessor owned 360's offer a substantial market for several core builders, but entry of too many suppliers could easily overwhelm the developing independent memory business.

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EIDIP industry report

• THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" JUNE 16,1971 • VOL.6,NO.15 P.J.McGOVERN,EDITOR

PROPRIETARY PACKAGES ATTRACT ATTENTION IN PLODDING SOFTWARE MARKET; USERS BUY MORE EDUCATION TO FILL SYSTEMS ENGINEERING GAP

When IBM unbundled, it more or less gave its blessing to the package software market, and the independent software houses were supposed to flourish. But then came the recession and the new hardware announcements. During 1970, as a result, most of the leading software companies -- as well as myriads of smaller firms -- ran into problems ranging from writeoffs and losses to out-and-out bankruptcy. And all the while, IBM lurks in the background, apparently waiting to unleash thousands of program products on a suspecting but needy market.

And since these packages are slow in coming, 1971 won't be a dramatic year for software, either. This is one conclusion of recent research by the International Data Corporation, publisher of EDP Industry Report. After analyzing IDC's survey of about 400 computer users earlier this year, and after talking with most of the leading software houses and consulting with other sources, EDP/IR has made the following conclusions about the software-related market for 1971:

- User spending on outside software will increase only 9% during 1971. This includes programs and services from both computer manufacturers and independents. User in-house software budgets will grow a little faster -- 13% -- to make the overall increase in user software outlays a modest 12.6% over 1970.

- The market for proprietary packages will zoom by 65% for 1971. But the total figure for the year will still be small -- $80 million to $85 million -- and about half will go to IBM for its Program Products. Growth for the independents, therefore, will be only in the 10% to 15% range.

- Education is a fast-growing software-related item, as users spend a third or so more this year over last, since it provides a way for them to avoid paying IBM's $15+-an-hour SE charge. But in education, also, IBM will receive about half the $70 million to $75 million the users spend during 1971.

Looking out to 1972, the overall software picture gets much better. EDP/IR expects a 22% growth in outside software spending during 1972 as more System/370s are installed, the recession recedes, and computer users move into more sophisticated applications and teleprocessing-based systems. And for the chart makers, EDP/IR expects the magical $1 billion market for all phases of software -- custom work, programming services, and proprietary packages -- to arrive in 1975.

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Who gets the software goodies? How aggressive will IBM be in developing and marketing its program products? How will the closely related area of on-line, software-based services impact the software industry? EDP/IR can't answer all these and other questions, certainly not in one issue. But in this issue we do investigate what's happening among the independent software houses and focus in particular on the area of proprietary packages.

The software slump . . . and beyond

The computer industry being what it is, the calculation of negative growth rates is a seldom-used technique, and EDP/IR had to refer back to the textbooks while examining the custom software market, as Table I (below) indicates. User demand for custom software (not including Systems Engineering services) is expected to fall off this year by 5%. Most of this will be felt by companies that are heavily involved in software development for the Federal Government or aerospace companies. Business from most other sectors will hold about the same, although the mainframe manufacturers, also, are purchasing less software support from outside.

Software packages, on the other hand, are moving well. Total spending for packages is up considerably as a result of IBM's active entry into the market, but revenues to the independents is still expected to rise a small amount this year. It should be noted, however, that this category is quite small in total dollars (only some $83 million for 1971) and that only a few independents have really done much in this area to date.

TABLE I: USER BUDGETS FOR SOFTWARE, 1969-1971
($ Millions -- U.S. only)

	1969	% change	1970	% change	1971
Custom software	$ 205	+ 25	$ 256	- 5	$ 243
SE services	110	+ 12	123	+14	141
Packages	20	+150	50	+65	83
Total External	$ 335	+ 28	$ 429	+ 9	$ 467
In-house	2450	+ 14	2800	+13	3170
User Software Total	$2785	+ 16	$3229	+13	$3637

Looking further out into the future, EDP/IR projects that external spending for software (in the three categories itemized above) will increase somewhat more rapidly than in-house spending. By 1975, for example, outside spending will hit the $1-billion level while in-house spending grows to just under $5.5 billion. As a result, external software will represent about 15.5% of the users' software budget in 1975, versus the 13% today.

These increases, of course, will go to IBM and perhaps some of the other mainframers as well as to independents. Indeed, some observers even today are wondering what will happen if the software market really is successful? Some of the imponderables are the 10% threshold that seems to irritate IBM, the combining of software into hardware, and the sale of software through communications lines, on a per access basis.

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1970: A tale of woe

During 1970, there wasn't a lot of support -- from customers or investors -- for software companies and many of the small firms disconnected their telephones, merged, or otherwise faded from the scene. Entry had been tremendously easy in an area where almost any two programmers could set up shop . . . but survival, it turned out, was not.

The shakeout affected even big, old, respectable software suppliers, most notably Computer Applications Inc. which filed for bankruptcy last year. Another company, Computer Usage, has a solid three-year record of losses and declining sales. And it doesn't take much browsing through the financial statements to turn up other major software houses with losses for Fiscal 1970.

The trouble with "software" companies, however, is not always software sales. Most of them have diversified into higher-level consulting and research, or into computer-based services, and sometimes it is the diversification that backfires, with a bang.

Applied Data Research solved some of its problems by shifting this year to a less conservative accounting policy for its software development costs: Now, it amortizes deferred costs over five years instead of the previous three years. For ADR and other companies heavily involved in software packages, the handling of deferred costs is fairly significant to their financial results. ADR's first quarter loss, for example, would have been 50% greater under its old accounting method.

Computer Sciences Corp., one of the biggest, offers an example of how diversification can hurt. It took a cut in 1970 profits because of a writeoff on Computicket, a computer-based service venture, which reduced its after-tax earnings by $6 million. And CSC is running into the usual heavy start-up costs on its huge remote computing network, Infonet, through which it will offer software applications such as an inventory control system.

Computing and Software bucked the trend by posting increased sales and net for 1970, and its 1971 six-month figures were a record high. But the company doesn't market much software at all, even though it has a lot of programmers. Most revenues (apart from facilities management and O&M contracts) come from various business services that depend on computerized data bases.

Comress's situation illustrates the time-bomb that can go off when development costs are deferred on software packages that don't pan out as expected. A $294,000 writeoff on two software systems, as well as on a proposed service for the medical community, was piled on top of a stiff operating loss -- its first in nine years -- to make Comress one of the money-losers of 1970.

Informatics had losses and writeoffs for its Fiscal 1970 that stemmed largely from its time-sharing operations, but for Fiscal 1971 (ended in March, 1971) it was back in the black.

Planning Research felt the recession primarily through its management consulting operations and defense projects.

And several other companies -- Computer Usage, Leasco, and Systems Development Corp. -- can all blame the software business for all or part of the losses they suffered during their 1970 fiscal years.

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Closely related markets

Most of the large software companies are inching into industry sectors that may or may not be considered part of the software market . . . but EDP/IR has not included them in the figures. Facilities management, examined recently (EDP/IR Apr.30,1971), is one example of this. The business of taking over a client's computer operations isn't too much more than a complete job of custom software development with operation and hardware rental thrown in, but a large portion of the $200 million to $400 million of FM revenues actually represents hardware being paid through a middleman.

In announcing its entry into the software business with ADL Systems, Inc., Arthur D. Little said that it considers facilities management one of the areas from which it can expect growth. It is getting started, however, by developing special software for clients and then attempting to convert it to generalized software packages that can be marketed for the benefit of ADL and the client.

Another borderline area is integrated hardware/software systems. These come in all shapes and sizes, from dedicated plant control systems to turn-key business data processing systems. And some of these systems are marketed by the software package vendors. Informatics, for example, has installed two of its computer-based message switching systems, at Dun and Bradstreet and at the Federal Reserve Bank of New York. Programming Methods (owned by GT&E) markets a communications front-end system. And other software houses offer more or less complex packages.

The minicomputer industry is a real hotbed of systems houses, often very small shops that tailor a few mini-based systems to specific customer needs. The systems house may design part of the hardware components. It is a moot question as to whether they should be included in the independent software industry, but they certainly do develop software as an essential part of their product.

Finally, there is the area of computer and software based services. This is a major and growing sector of the information processing business, but for purposes of definition is not included here under the category of Software. These services may be highly substitutable for outright software from the user's point of view, so a little computer power may be the only difference between selling an applications service and selling a proprietary software package. This area of the industry will be discussed in more detail in an upcoming issue.

Big battle for the same dollars

At least one thing is painfully clear from the above discussion of the software and almost-software markets: Everybody in and out of the computer industry is into software development, by whatever name, and this means that a large number of different forces are out to get the users' software dollars . . . or think they are. And the total amount of these dollars isn't going to increase much above the projected levels shown above, no matter what. User budgets don't gyrate that dramatically.

With all these forces in the external software market, even robust demand won't help bring profits since too many competing suppliers will drive prices to rock bottom. And there is always the question of IBM and the other mainframers. In the next section of this issue, we will consider the clearest of the software areas and look into the poignant story of IBM versus the independents in the attempt to sell program products.

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AFTER UNBUNDLING, SOFTWARE PACKAGE REVENUES START TO ADD UP

During this year, U.S. computer users will spend about $83 million on proprietary software packages, according to projections by EDP/IR. About half that represents rental of IBM program products, and as such does not mean direct business to the independents. But the very fact that IBM is in the proprietary software market is helpful to the independents.

As time goes by, the user is learning that he is expected to purchase software, and he is gradually learning that he should look carefully at what he is buying, not just continue with IBM because it is IBM. A few of the smarter users, in fact, are finding out that some of IBM's program products, although valuable, could be considered tools for selling more hardware.

In any event, the market for software packages is growing. A few independents have been noticeably successful with their packages: ADR with Autoflow; Informatics with Mark IV; Comress with Scert. The list could be expanded, but it raises an interesting dilemma: Has the economy really impacted software sales? Or, as some observers point out, is it that, to date, most companies have made it big with only one package, then had trouble. One reason for this, the argument goes, is that maintenance is much more expensive than most companies anticipate and it is quite hard to identify a successful package in advance.

The figures don't prove this theory, but last year Comress had a slump, and ADR had lower-than-expected orders for its proprietary packages. Most companies say that things have begun to pick up again, and if this is the case, the argument will be shot down. In the meantime, however, newer packages will be coming under scrutiny . . . even most of the 150 or so from IBM that haven't yet been delivered.

So at the present, there is a question as to just how much unbundling has changed the rules. The leading packages from independents were gaining success even before unbundling had a chance to have any significant effect. And the atmosphere for software sales is better, although in the package business the independents are selling quality and savings of computer time, not price. The business is a good way for independents to earn a high margin on each added package sale, once the cost is offset. But there are a few facts to be considered.

Fact of life Number One: IBM

Most independent packages are designed for IBM users, so IBM's strategy for program products is critical to the independents. IBM's pricing, contract terms, program product types, and even delivery schedules combine to define the marketplace open to the independents. And, IBM can have an additional impact by changing operating systems or machine instructions. This isn't too much of a problem, because these changes affect user software as well, but the independents must remain compatible.

It is in pricing that IBM has the most flexibility. The Grim Gray Giant can underprice any competitor if it desires. It has a huge base over which to spread development costs and, of course, has lower marketing costs because its representatives already call on IBM accounts. Typically, IBM's prices run from a few hundred dollars a month for an applications package (even less on System/3) to several thousand dollars for sophisticated file management systems. At least one software vendor has suggested that IBM prices packages without rhyme or reason, depending on the competition, but no proof has been offered.

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It is certainly true, however, that the independents -- unlike their counterparts in the plug-compatible equipment market -- can't sell on price alone. Indeed, they must sell on quality and CPU efficiency, and many have chosen to compete directly with IBM offerings.

Informatics' popular Mark IV system competes with free (on 360) IBM software, for example. Comress' primary money-maker, Scert, does not compete with IBM programs, but the company offers other packages which substitute for IBM software supplied before the advent of separate pricing, and it has under development several packages to compete with priced IBM program products. ADR's subsidiary, Programmatics, recently unveiled a proprietary package for System/3 users which it flamboyantly bills as "the software customer's first competitive choice as a result of unbundling."

Contract terms

Almost a part of pricing, contract terms are very important in package sales. "The best contract is no contract," seems to be the users' desire, and at least one supplier is offering software at a dollar a day. Lease plans that are binding for a year or more are more typical, but signs are that shorter-term contracts may become the norm.

One reason is that IBM rents programs by the month, cancelable on 30 days' notice. This gives the user great flexibility to switch software, especially during the first few months when he is experimenting. (As an alternative, some vendors allow a free trial period before they require a commitment by the user.) Also, as one independent reports to EDP/IR, users usually don't want to commit funds for a long period. ADR has recently given customers the choice of renting by the month, and Informatics has decided on three months as its minimum contract period.

In addition, every package requires a certain amount of installation, training, and maintenance, although the latter varies widely depending on how dynamic the program is. These services may be included in the basic price or they may be billed separately. Various pricing schemes have emerged: One is to charge a fixed fee of, say, several thousand dollars and an associated monthly rental of a few hundred. Another is to have a higher monthly fee which includes support. Alternatively, a single payment for a long-term lease or a permanent license may include both installation and maintenance for several years.

The provision for service, in fact, could be called "Fact of life Number Two." And it can be a real problem to the small independent who -- like the small peripheral manufacturer -- has a good product but a small sales and support organization. For an independent to be successful, he must develop a support organization or find someone who will do it for him.

Middlemen for software sales

Some companies already are set up to handle the product developed by another organization. Cullinane Corp., for example, got started with a self-written output processor called Culprit. Now, however, it is going in other directions. It OEM's a special version of Culprit to PHI for use in its payroll system, and has moved over 100 packages in this manner. Cullinane has marketed packages developed by Boston's National Shawmut and First National banks, and its latest entry is a program for standardization, called SPL, developed by a German software firm and already used at about 40 installations in Germany and Switzerland.

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PHI Computer Systems, in addition to buying OEM, is also into the area of marketing other systems. One example is a package it developed jointly with the Chase Manhattan Bank and sells for $25,000. The entire financial area, in fact, is one with much standardization and therefore much interest. There are several banking packages being marketed in the $200,000 price range, and IBM's latest announcement in package products includes two brokerage packages for securities orders matching and telecommunications control. They will rent for $2100 and $2500 a month, respectively.

User thirst for education

Associated with the growth in software expenditure is education, one of the fastest-growing items in computer user budgets. It more than doubled between 1969 and 1970, and 1971 education outlays are predicted to be in the $70 million to $75 million range, up another 35%. This, like spending for program products, is not a huge market and, again, about half the user outlays will go to IBM.

Other primary suppliers of computer-related training are the Control Data Institute, the Honeywell Institute of Information Sciences, and the Electronic Computer Programming Institute. These organizations have probably gained revenues because of unbundling as users upgraded their own staffs rather than pay for SE services or custom software. Also, since users have to pay for IBM education now, there has been more impetus to shop around.

The EDP schools, however, earn money from other sources. Most of them cater to individuals trying to improve themselves to get better jobs, and during the slow economy have had some business as the result of increased unemployment. Likewise, college night and extension courses have been more in demand as people train for potential jobs working with computers.

Software and the IRS

For some time now (EDP/IR July 30,1969), there have been questions as to Internal Revenue Service guidelines on software. Over a year ago, it was made fairly clear that a user had to capitalize a software package he purchased from an outside supplier, but could expense either rental payments for a package or software that he developed for his own use or contracted to a custom supplier.

This April, however, the Data Processing Management Association claimed that the IRS was considering a new guideline which might, in effect, require the user to capitalize all software costs paid to outsiders, for tax purposes, and write them off over a five-year period. The DPMA protested to IRS that this would hurt both software suppliers and users. Nothing else has been published, but such a new guideline could affect the level and type of markets for custom software.

Prognosis

Computer users in the U.S. say they will be spending 16% to 18% more a year for software (including programmer salaries) during each of the next few years. It is unlikely that this total spending trend can be changed very much, so the obvious market strategy for the company pursuing these dollars is to convince the user to spend less internally and more outside. Some independents think they can do this, but point out they must force users to opt for accounting techniques that reward cost savings and get away from "time and materials" type accounting. This may be fairly hard to achieve.

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NEW REGISTRATIONS BY COMPUTER COMPANIES

[Listed below are brief descriptions of proposed security offerings, from firms in the data processing field, that are currently in registration with the Securities and Exchange Commission. The preliminary prospectus for any issue may be obtained from the underwriter.]

BUNKER RAMO CORPORATION	Bunker Ramo Corporation, Oakbrook North, 1200 Harger Rd., Oak-Brook, Ill. 60521, which manufactures electrical and electronic components, systems and knitted deep pile fabrics, on May 21, filed 2,539,410 outstanding shares common, owned by Martin Marietta Corporation. These shares are to be offered for public sale at a maximum price per share of $15.375. Underwriters are headed by Allen & Co., Inc., 30 Broad St., and Hornblower & Weeks-Hemphill, Noyes, 8 Hanover St., New York 10004.
EDUCATIONAL GUIDANCE SYSTEMS CORP.	Educational Guidance Systems Corp., 342 Madison Ave., New York, which provides certain computerized services for people who seek to attend or are attending college, on May 7 filed 200,000 common. The proceeds, at $2.50 per share, will be used for working capital and other corporate purposes. The underwriter will be Baroody & Co., 4040 Gault Ocean Dr., Ft. Lauderdale, Fla.
ITEL CORP.	ITEL Corp., One Embarcadero Center, San Francisco 94111, which is engaged in manufacture and sale or lease of computer equipment and in providing DP services and arranging transportation leases, on May 11 filed $30 million of convert. subord. debentures. Proceeds will be used to repay borrowings and for other corporate purposes. The underwriters are headed by DuPont Glore Forgan Staats, Inc., Bank of America Center, and Dean Witter & Co., Inc., 45 Montgomery St., both of San Francisco.
RAPIDATA, INC.	Rapidata, Inc., 20 New Dutch Lane, Fairfield, N.J. 07006, which provides time-sharing services, on May 21, filed 140,000 common. The proceeds will be used to retire short-term debt and for other corporate purposes. The underwriters are headed by D.H. Blair Securities Corp., 437 Madison Avenue, New York.
SPERRY RAND CORP.	Sperry Rand Corporation, 1290 Avenue of the Americas, New York 10019, on May 7 filed $160 million of sinking fund debentures, due 1996. The proceeds will be applied to the reduction of short-term debt and term bank loans. The underwriters are headed by Eastman Dillon, Union Securities, Inc., One Chase Manhattan Plaza, New York 10005.
WELLS TP SCIENCES, INC.	Wells TP Sciences, Inc., 1450 Broadway, New York 10018, which manufactures a communication adapter and related software package which converts an IBM 1130 computer into a front-end/message switching unit, on May 19 filed 180,000 common. The proceeds, at $5 per share, will be used to repay short-term bank borrowings and for other corporate purposes. Wells Management Corporation owns 68.8% of the company's 500,000 outstanding common shares. The underwriters are headed by Grimm & Davis, Inc., 15 William Street, New York 10005.

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EIDIP industry report

• THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" JUNE 25,1971 • VOL.6,NO.16 P.J.McGOVERN,EDITOR

Drastic change due a non-market

WITH USER DEMAND EXPECTED TO PRODUCE 20% GROWTH IN NUMBERS, MINICOMPUTER SHIPMENTS COULD ZOOM AS IBM ADDS STRUCTURE TO MARKET

MEMPHIS, Tenn, Jan. 12, 1971 . . . The Memphis branch of U. S. Testing Co., Inc., has placed one of the first orders in the nation for a new IBM computer to speed soil analyses for thousands of farmers nationwide.

WILMINGTON, Mass., March 10, 1971 . . . The Charles River Laboratories, Inc. here has ordered one of IBM's newest computers to help speed the reporting of data from blood analyses . . . [it] is one of the first by a New England company for an IBM System/7.

SOMEWHERE, U.S.A., May 15, 1972 . . . With the startup of five of IBM's new System/7 computers here, the XYZ Biscuit Plant installed the 1,000th of these small sensor-based computers that can measure, test, analyze, and control industrial and laboratory events as they are happening.

Emphasis has been added in the first two statements, but they were made by the companies identified; the third will never appear exactly as EDP Industry Report has presented it, but the dateline on it is more fact than fiction (and there will be a first installation announcement sometime in September), and the implication is probably an understatement. System/7 -- whether it is termed a minicomputer or a control processor -- is about to impose an internal restructuring on the actual non-market that today is called the minicomputer industry. Consider the following:

- As expected from a new hardware product, System/7 is the fastest mini around on the basis of raw CPU performance in a "control" instruction mix and ranks second only to Data General's Nova-800 in operations per second per dollar (EDP/IR Nov.18,1970).

- Prior to System/7, the mini "industry" could expect an annual increase of 20% in the number of units shipped between now and 1975, but this projection is based on simple user demand . . . which has characterized the "market" to date.

- Even today, minicomputer suppliers are following market demand rather than creating it; it is still too early to measure the total effect that System/7 will have on this marketplace. It will be considerable.

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The conclusions just presented come from a study of the Dedicated Application Computer Marketplace, recently completed by the International Data Corporation, the publisher of EDP/IR. The study of over 2800 users confirmed EDP/IR's long-held belief that minicomputers represent a function -- a state of mind -- rather than a long-term, viable product. In this issue we take a look at these demands -- both the markets and non-markets -- that minis have filled in the past. We also attempt to assess the impact that IBM's System/7 may have on the total marketplace.

A little bit of history

We constantly attempt to examine current events in the light of history . . . to identify currents, if they exist. So far, there has not been enough history in the computer industry to bring more than meager guidelines to the analyst. But the few historical facts existing seem to be at least the beginnings of patterns; and they are unlike those in any other industry. The so-called minicomputer market is a case in point.

It began only six years ago, when Digital Equipment Corp. shipped its first PDP-8s. These tiny (for the time) computers for the first time provided several realities to several groups of people. For example:

- The scientist finally found a personal computer -- a glorified calculator, if you will -- that he could put in his office and justify on the grounds that it would prevent his using time on the general-purpose computer at "central" headquarters.

- The researcher, similarly, found a control instrument that could keep track of his experiments and provide monitoring functions. It could be moved from experiment to experiment -- even used as a calculator at times -- but was dedicated once it was in use.

- Equipment manufacturers -- from those putting sophisticated control boxes into large systems to those who use a mini to control a multiple-station key-to-disk system -- have accepted minis as the least expensive way (at this point in time) to accomplish their logic functions.

- Designers of communications networks, especially those connecting a network of computers and widespread input points, have found that minis often make economical communications concentrators.

- Systems analysts for process control -- once dependent on larger equipment available only from general-purpose computer manufacturers and supplied at general-purpose prices -- have begun to realize that minis can provide on-line monitoring or control at mini prices.

As many of the above descriptions indicate, minicomputers have begun to represent an economical state of mind rather than a necessary element in a system. It is their function that is needed. This function is necessary for the advancement of automation in industry; the need of a minicomputer to fill it is becoming less and less necessary. Many minis have been economical luxuries in the past.

At the crossroads

Some minicomputer manufacturers have realized this; most by their actions seem to say they have carved out their niche and are going to stick to it. The crucial

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point is the customer the mini manufacturer is after. Today, there is little aggressiveness on the part of the manufacturer. IDC's study indicates that over half of 1970's $230 million of minicomputer shipments went to OEM manufacturers or systems houses, and that:

- Despite a significant drop in system prices because of technological advance and price competition, new users are not being attracted in sizeable numbers. The best prospects for new orders today are still with existing customers . . . in penetrated market sectors.

- Industry suppliers seem to be following market demand rather than creating it. Few current users are thinking of breaking new application ground, just expanding present usage. Moreover, prospective customers talk primarily of duplicating what their colleagues have already done.

This strong dependance on OEM demand could be dangerous, the study suggests, because the major revenue potential depends on expanding end-user markets . . . markets that will provide opportunities for peripheral upgrade, business stabililty, and improved profit margins. With no dramatic change in marketing, simple user demand will bring healthy growth to the minicomputer manufacturers that survive. The IDC study indicates the following:

U.S. MARKET FOR MINICOMPUTERS (EXCLUDING SYSTEM/7)

Year	Number of Units	Value of Shipments ($ Millions)
1969	6,430	$ 188
1970	8,730	230
1971	11,300	280
1972	14,000	350
1973	16,600	420
1974	19,600	490
1975	22,000	550

But System/7 shipments will begin this September. By the beginning of 1972, IBM is expected to be shipping more than 100 of these computers a month, so during the period involved in the chart above, IBM could add an additional 10,000 "minis" -- worth several hundred million dollars -- to the count. And the success of System/7 may very well determine the success of the other manufacturers.

In any case, it is easy to see that minicomputers are going to be a growing portion of the numbers in the computer industry, but will never constitute a large portion of the dollars. Even if EDP/IR's projections are correct, minicomputers will constitute less than 13% of U.S. computer shipments in 1975.

But the little things are significant. Collectively, they represent the first extension of computer concepts into other portions of capital equipment and at least the working environment of most people. Their functional equivalents, more and more, will be hidden within everything mechanical that people use. They will hopefully accomplish IBM's pronouncement that machines should work so people can think. End of sermon.

The important thing to remember when considering the minicomputer "industry" or "market" is that it never has been such, and probably never will be. Even

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Digital Equipment Corp. -- the leading minicomputer manufacturer -- has not been able to create a homogeneous marketplace; on the other hand, DEC's announcement of the PDP-16 seems to acknowledge an understanding of the situation. This made-to-order logic box (EDP/IR doesn't consider it a computer) will perform the function that many of today's minis are doing. It has hard-wired instructions and a read-only memory -- much like the "computers" used on Apollo space capsules -- and can do pre-specified programs. It is not programmable by the user.

In a sense, the PDP-16 is a move by Digital back toward its origins. The company started into business by building logic modules that designers could order off-the-shelf and configure to their requirements. Some engineers started to make computers from these modules, and the PDP (Programmed Data Processor) series was born.

The key thing -- even in the early days -- was that customers came to DEC. It was essentially a mail-order house when it began. This philosophy has continued through much of DEC's computer business; its salesmen have never even been on commission. It is easy to see, therefore, why DEC has not become the force in the minicomputer business that IBM is in the general-purpose computer industry. The minicomputer users, to date, have pretty much called the shots.

What do you do when you get a mini?

IDC's study of dedicated application computers in the United States indicates that 84% -- about 21,000 of the 25,000 -- were made by the minicomputer manufacturers. The remaining 4,000 systems -- such as IBM's 1800, Control Data's 1700, and XDS's Sigma 2 -- are more expensive "midicomputers," if you will, and will be replaced over time by minis or IBM's System/7. A look at how these computers are used today gives clues as to the future for various manufacturers.

There are about as many ways to use dedicated application computers as there are computers installed. After analyzing many of these, however, EDP/IR thinks they can be grouped into three broad categories:

- Monitoring. About 40% of all dedicated application computers in the U.S. today are used for this purpose. Nearly half of these collect data on an off-line basis. The remainder are split roughly 50/50 between those that monitor continuous processes or experiments and those that collect and digest data from discrete time events.

- Control. Another 25% of dedicated application computers are used in closed-loop applications where the central processor is performing actual feedback control of a manufacturing process. Here again, these applications split roughly down the middle between continuous control such as that done in petroleum refining or paper making, and discrete control such as the automatic routing of packages in a central post office or distribution center.

- Stand-alone. The other 35% or so of today's dedicated application computers are used as individual computers or in a true component fashion. Roughly one-third of these are small scientific computers, pure and simple; another third are used as small business computers or in miscellaneous applications such as typesetting or computer assisted instruction; the remaining third can be found as part of a key-entry system (key-to-disk, for example) or in a communications control function.

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IBM is definitely going after business in the first two categories, and if its efforts with System/7 are successful the market could grow rapidly enough to keep many other manufacturers happy. In the third category -- the other third of the minicomputer market -- IBM has not yet mounted a frontal attack. It will, however, impact the communications area as many control functions are integrated into the CPU. Also, IBM can't be counted out of the key-entry business, since its very origins evolve around the keypunch. The other isolated areas seem to still be there for the taking, at the present, but more than one industry observer has suggested that additional versions of System/7 can be expected.

How does the marketplace look?

In additional to breaking down into the functional areas described above, the dedicated application computer market can be examined on an industry-by-industry basis. Some uses for minis -- such as in communications or key-entry applications -- completely cross industry boundaries; others are quite concentrated. Here's a look at some of the major industries, with an examination of what's being done, which manufacturers have the business today, and what the growth prospects are:

Petrochemicals. At yearend 1970, about 2000 dedicated application computers were being used by crude petroleum and chemical manufacturers to control plants, acquire or monitor data, and handle communications with larger CPUs. Companies in this industry were the first to use computers to run plants, and IDC's study indicates that current and prospective users, in the future, will essentially be doing more of the same . . . or finally doing what their competitors are.

This industry is "IBM Country," with the 1800 itself representing about half the computers installed. DEC, CDC, and GE are the only runners up, and none of these accounts for even 10% of the market. It is quite obvious, therefore, that this established industry will be a prime market for IBM with its System/7.

Electrical Machinery Manufacturing. With about 15% of all the dedicated application computers installed at yearend 1970, this manufacturing sector is the largest single user of such systems. Applications for minis and their big brothers are of almost every variety, with areas of concentration being engineering calculations, equipment testing, data acquisition and reduction, and machine control.

Perhaps because of this wide range of applications, no single computer manufacturer has the business. Control Data leads with about one-third of the installations, DEC has about half as many, IBM and GE show up at the 10% noise level. In terms of future use of minis, users say in general that they want to broaden the applications they are implementing, and specifically want to move more into equipment with telecommunication capability and sensor-based feedback and monitoring.

Education. Next to electrical machinery manufacturers, educational institutions are the largest users of dedicated application computers in the U.S., with about 3,500 units installed. And their use of these computers represents a virtual microcosm of the total marketplace -- laboratory equipment monitoring, engineering calculations, communications, time sharing, instruction about computers, and experimentation in computer-assisted learning.

Digital Equipment got its start by selling computers in the educational environment, and essentially turned its customers into many of todays "inside salesmen." Because of this, DEC can chalk up about half the computers used in education, and will probably retain its dominant position in this market.

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Printing and Publishing. Although it represents less than 5% of today's minicomputer marketplace, this industry has received a lot of publicity over its use of computers for hyphenation, justification, automatic typesetting, and on-line editing. Perhaps this is because many reporters see this use, and subconsciously fear its implications. This fear is uncalled for, and this application is a good example of how computers can speed up a mechanical function.

This market has been wooed by DEC from the beginning, and Digital has over three-fourths of the business. In the beginning, computers in this type of application had to supply punched-paper tape output to be compatible with typesetting equipment. Now, however, users are talking of using magnetic tape or large central disk files with minis just part of large integrated communications networks feeding central 370s or other business computers that also take care of invoicing, billing, and the like.

Service Bureaus. At yearend 1970, about 2,000 dedicated application computers were installed at service bureaus, and the installed base was expected to increase by 75% during this year alone. Some of the computers were used for engineering calculations or in connection with off-line printing, computer output microfilm, or data entry systems. The largest portion, however, are components in commercial time-sharing networks.

Across the board, DEC and Varian supplied more than half the units installed at service bureaus. In the data communications or time-sharing installations, however, Honeywell and Interdata have a considerable portion of the business. And Hewlett-Packard, along with DEC, has supplied the processor for small or in-house time-sharing systems.

Government. As in the case with educational use, government agencies and locations use dedicated application computers in a wide variety of ways and represent about 8% of the yearend 1970 installed base. Data transmission, data collection, and key-entry systems represent the bulk of the computers installed. DEC, Control Data, and XDS together have about two-thirds of the installed base.

Hospitals. Although only 3% of dedicated application computers were installed in hospitals at yearend 1970, IDC's survey indicates this will be one of the fastest growing areas for minicomputers. In addition to communications and data collection, hospitals are increasingly more interested in such applications as patient monitoring of vital life functions and automated laboratory systems. DEC has half the units currently installed. But IBM is well represented with its 1800s at one-third of the sites, and hospitals have shown a marked interest in System/7 . . . either to tie-in to the 1800s or feed directly into installed 360s.

And so it goes. Over one third the dedicated application computers installed today are used in durable goods manufacturing, and their uses vary somewhat but generally fall into the patterns discussed above. One of IDC's important findings is that user thinking today is pegged to the present state of the market.

- Established users are thinking in terms of expanding their current operations;
- New users are thinking in terms of duplicating current operations now implemented by colleagues in the industry;
- Neither group is thinking of breaking new ground.

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U.S. SHIPMENTS OF DEDICATED APPLICATION COMPUTERS, 1969 & 1970, BY NUMBER

(Based on Census Figures maintained by EDP Industry Report)

Company	1969 Shipments (Units)	1970 Shipments (Units)
Digital Equipment	3,178	3,469
Hewlett Packard	824	910
Varian	486	763
HIS	456	634
Data General	225	530
General Automation	126	399
Interdata	219	297
Other Mini Manufacturers	918	1,727
SUBTOTAL	6,432	8,729
IBM	265	110
CDC	103	47
XDS	61	130
GE/PAC	77	85
Other Midi Manufacturers	35	19
TOTAL	6,973	9,120

The changing character of shipments in the dedicated application computer marketplace is illustrated above. IBM's primary entry -- the 1800 -- was in its fifth year of shipment life last year and couldn't be expected to keep pace with the growing number of minicomputers being manufactured. Even Digital, which shipped about 3,500 systems, couldn't hold its own share as more than 60 companies were moving minicomputers off their shipping docks. The number of units shipped grew 36%.

But the overall pattern didn't really change, as the IDC study indicated. The market -- if it really is a market -- is diffused and fragmented. And there is every indication that the traditional minicomputer suppliers would never have had the muscle to bring order out of the virtual chaos that has existed.

The new minicomputer market

This is all about to change. IBM has the necessary resources to structure the minicomputer business into the capital equipment market it represents. Several of the other manufacturers -- for some time to come -- can probably show good growth supplying communications processors, components for various data processing or industrial control subsystems, and the like. But those OEM markets are very likely to be captured by the semiconductor manufacturers or the builders of general-purpose mainframes.

So the traditional minicomputer supplier, IDC says in the study, should move with the developing trend and concentrate on those areas where he can offer turnkey systems to end users where brand-name status means loyal customers and better profits. "IBM may be bringing the dedicated application computer market into the mainstream of U.S. information processing. While this won't happen overnight, the signals seem to be there -- and astute suppliers and observers of the dedicated market have ample time to develop their plans for participating in a rapidly changing industry." One where IBM may be welcome in the long run.

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NEW REGISTRATIONS BY COMPUTER COMPANIES

[Listed below are brief descriptions of proposed security offerings, from firms in the data processing field, that are currently in registration with the Securities and Exchange Commission. The preliminary prospectus for any issue may be obtained from the underwriter.]

AUTOMATION SCIENCES INTERNATIONAL CORP.

Automation Sciences International Corp., 15 Columbus Circle, New York 10023, a subsidiary of Automation Sciences, Inc., which markets computer equipment manufactured by Fujitsu Ltd., (a Japanese company) on June 3 filed 400,000 common. The proceeds, at $5 per share, will be used to buy computer equipment from Fujitsu and for other corporate purposes. The underwriters are headed by Mayflower Securities Co., Inc., 32 Broadway, N.Y. 10004.

COMPUCHARGE, INC.

Compucharge, Inc., 1044 Northern Blvd., Roslyn, N.Y. 11576, which is developing a computerized custom credit card system for use by retail stores, on May 28 filed 100,000 common. The proceeds, at $6 per share maximum, will be used for working capital and other corporate purposes. The underwriter is Morton Kominsky, 7520 Bergenline Ave., North Bergen, N.J. 07047.

DYNAMIC INFORMATION SYSTEMS, INC.

Dynamic Information Systems, Inc., 12018 Riverwood Dr., Burnville, Minn. 55378, which was organized in Dec. 1970 to develop and market a fully automated terminal storage and retrieval system, on May 28, filed 250,000 common. The proceeds, at $3 per share, will be used for general corporate purposes. The underwriter is to be specified later.

NICOLET INSTRUMENT CORP.

Nicolet Instrument Corp., 5225 Verona Rd., Madison, Wisc. 53711, which makes electronic measurement instruments incorporating special purpose computer techniques, on May 5 filed 380,000 shares common, of which 320,000 are outstanding. The proceeds plus $300,000 to be received from the selling shareholder, Fabri-Tek, in retirement of its indebtedness to the company, will be used for general corporate purposes. Fabri-Tek owns 85.2% of the company's outstanding 376,000 common shares. The underwriters are headed by Piper, Jaffray & Hopwood, Inc., 115 S. 7th St., Minneapolis 55402.

OPTICAL MEMORY SYSTEMS

Optical Memory Systems, 15200 S. Lyon St., Santa Ana, Calif.,92705, which makes optical Read-Only Memory devices, on May 14, filed 150,000 common. The proceeds, at $5 per share, will be used for research and development and the balance for other corporate purposes. No underwriting is involved.

REYNOLDS AND REYNOLDS

The Reynolds and Reynolds Company, 800 Germantown St., Dayton, Ohio 45407, which sells business forms and systems, on April 30 filed 255,000 shares common -- 25,000 for sale by the company and 230,000 outstanding shares for sale by the holders. The proceeds, at $50.75 per share maximum, will be used to develop and market new data processing services for general business use. The underwriter will be DuPont Glore Forgan Staats, Inc.

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EDP industry report

• THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" JUNE 30,1971 • VOL.6,NO.17 P.J.McGOVERN,EDITOR

INTELLIGENT TERMINALS START POPPING UP ALL OVER; GREAT GROWTH EXPECTED AS IBM, WITH ITS 3735, PROVIDES MARKETPLACE IMPETUS AND DIRECTION

Just about the time it looks as if computer-related hardware can be carefully categorized into consistent capsules, along comes a new buzz phrase that causes confusion . . . whether or not it represents a valid new concept in an ever-changing industry or simply a contrived cloud cover.

Case in point: Just about everybody seems to be talking about "smart" or "intelligent" terminals these days . . . and quite a few manufacturers are doing something about them. Everybody seems to know what they are, but definitions vary about as much as definers. Purists, in fact, can argue about degrees of smartness and wonder if there isn't a difference between smart and intelligent. In this first look, EDP Industry Report is going to call all of them intelligent terminals -- "ITs" -- and reserve final judgement. All ITs share common functions:

= They are extensions of a host computer, and communicate with it over some distance . . . usually by telephone line, but not necessarily in an on-line or real-time mode.

= They accept data where it originates and -- with at least limited processing power -- begin to process this data for computer consumption as soon as it enters the system.

= They take over some of the chores required for transmitting the data, manipulate the form of the data, and in some cases actually do part of the arithmetic and logical processing for the host computer.

Several new types of intelligent terminals have been announced during the last month, and it is clear than an IT -- at least today -- can be anything from a CRT-keyboard combination with just enough processing power to format data and take care of some transmission control . . . to a minicomputer running a harem of line printers, card punches, and clusters of CRTs. The definition could even include a 360/50 operating as a preprocessor for a time-sharing 360/67, but true general-purpose computers used as ITs are not being considered in this issue.

For this initial discussion of intelligent terminals, EDP/IR is examining the micro-processors, mini-based systems, remote batch terminals, and CPU-controlled buffered terminals. This is the market into which many independent companies have begun to penetrate . . . the market dominated today by IBM and Burroughs . . . the market that will take on shape as IBM sets the marketplace tone with its programmable buffered terminal, the 3735 (EDP/IR Mar.24,1971).

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Some signs from the numbers

The market for intelligent terminals is probably the fastest growing equipment sector in the computer industry. The numbers -- and associated value of gear -- depend on definition, but the installed base of countable units grew from the 7,000-unit level at yearend 1970 to over 9,000 units just six months later (see page 3). And business should really get brisk with deliveries of the 3735.

In any event, all the signs are clear that this is a growing area. From various surveys of user spending conducted by the International Data Corporation, publisher of EDP/IR, it is obvious that spending for all terminals will increase during the next several years. Expenditures on terminal hardware (purchases or rentals) are expected to almost quadruple by 1975, and even double as a percentage of spending for computer system hardware:

ESTIMATED AND PROJECTED SPENDING FOR TERMINAL HARDWARE
($ Millions of User Expenditures -- U.S. Only)

Year	Computer System Hardware	Terminal Hardware*
1968	$ 4,250 million	$ 150 million
1969	5,100	195
1970	5,600	250
1971	$ 6,200 million	$ 330 million
1972	7,200	445
1973	8,275	590
1974	9,450	775
1975	10,750	975

* Included in computer system hardware figure

As these projections show, there will be a continuing pattern of growth in the terminal area. At yearend 1970, there were about 175,000 terminals operating with almost 12,000 general-purpose computer systems. By 1975, EDP/IR estimates, there will be more than 600,000 terminals linked to about 37,000 general-purpose computers, and an additional 165,000 terminals connected with dedicated application computers. In addition, the number of general purpose computers operating as terminals themselves will grow significantly from today's 2,000 level.

What kinds of intelligent terminals are there?

After careful consideration of the varied products that are called smart terminals at one time or another, EDP/IR has divided all ITs into four product categories. Even at this writing, however, smart terminals are being announced that don't quite fit. But most of those terminals presently installed or expected to be shipped in large quantities are included. We fully expect to re-evaluate this logical but somewhat arbitrary structure as the market develops.

- Remote Batch Terminals. Accounting for half the ITs installed today (page 3) these devices began as agglomerations of printers and card reader/punches designed to accept and transmit input and output between central computers and a remote site. A flood of independents have entered the market with RBTs that can also handle general processing, and this type device will likely fade into other categories.

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- Micro-Processors. These country cousins of the IT family are just smart enough to give some help at key-entry stations. As keypunch replacements they take over a limited amount of format and transmission processing. The micro-processor concept was given a boost -- and a black eye -- by Viatron, but manufacturers with a little more stability are taking it up. The future of such systems will be decided when IBM announces how it will replace the keypunch.

- CPU-Controlled Buffered Terminals. Without a mainframe, these devices have at most limited use; with one, they are powerful for automating input. They lead an operator through the procedure of filling out forms, and their memory and logic are restricted to this rote, record-oriented procedure. This market segment is the natural stomping ground of the mainframe manufacturers, and Burroughs has done well in this area. Once IBM takes command of this market with its 3735, it could have the greatest growth potential of any IT.

- Mini-Based Systems. The approach taken by many independent manufacturers, these devices are potentially the brightest and most flexible of the ITs. The expense of the minicomputer holds the price up, though, and the installed base of these systems is lowest. But if the minicomputer function is replaced by true, low-priced components (EDP/IR June 25,1971), watch out -- there will be no reason to have anything but such an intelligent terminal.

Before looking more carefully at each of these categories and discussing the products available today, we should take a look at the numbers. As implied above, the IT market is too diverse and starting to grow too rapidly for any sort of projections to have much meaning. We can, however, examine what's happening right now. A lot of the IT manufacturers are willing to talk about their numbers; the activity of others can be measured. The following table, prepared by IDC's Corporate Planning Service, shows why growth prospects for ITs look promising.

INSTALLED BASE OF INTELLIGENT TERMINALS -- BY NUMBER

Type of Terminal	Yearend, 1970	Midyear, 1971	Percent Change
Mini-Based	260	435	+ 67%
Micro-Processor	900	1900	+ 110
Remote Batch	3400	4000	+ 14
CPU-Controlled	2500	3000	+ 20
TOTAL	7060	9335	+ 32%

IBM's role -- past and future

At this point in time, IBM's only installed IT -- and some people would exclude it from this classification -- is the 2780, a rather dumb remote-batch terminal. It accounts for more than half the devices in the remote batch count above, at any rate. And, in the total picture, the 2780 is important because it shows that IBM's thrust is to prevent its ITs from being too smart. As long as they depend heavily on the CPU, they are less likely to be replaced by an independent.

IBM's whole new product line (EDP/IR Mar.24,1971) is designed around heavy communications activity . . . under CPU control. With their souped-up input/output

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rates, the 370s will be able to ship data in and out of the CPU at rates of eight to ten times those of the 360s. Also, the CPUs will be able to communicate with a much larger number of peripheral devices. The 370/155, for example, can have over 2,500 devices on line; the 360/50 can handle 256.

And the 3735 -- IBM's programmable buffered terminal announced at the same time as the 370/135 -- gives the clearest view of IBM's approach to using ITs as part of a distributed processing network. This terminal is designed to automate forms handling, and can perform arithmetic, logical, editing, and validation functions to expedite the preparation of invoices, checks, and the like. An internal disk -- kept up-to-date by the host computer -- controls the processing and tells the operator exactly what he should do next.

Thus IBM -- the company that for years has held the hands of corporate executives . . . telling them which data processing decisions to make and then supporting the decisions with hardware, software, and education -- is the force to contend with as the intelligent terminal marketplace develops. Most competitors will have to sell against IBM and its version of teleprocessing.

CPU-connected terminals . . . the IBM version

And IBM's version hangs around the 3735. This terminal, today, is less intelligent than it probably could be, because that's the way IBM wants it. As a result, the machine has quirks. It's only output is a System/3 card-reader/punch and a Selectric typewriter. Thus, printing speed is limited to 15 characters per second, as announced, so the 3735 wouldn't be a very good remote-batch terminal. Likewise, since only one keyboard can be hooked to the system, it is removed from consideration as a multiple-station key-entry device.

The 3735 has extensive memory and processing capability, but it can be programmed only from its host 360 or 370, and by an experienced programmer. This might be considered a good point, however, since it essentially "idiot proofs" the terminal. The local operator isn't able to experiment with the programs -- or delete any data -- in his spare time.

. . . and the story as started by Burroughs

After introducing a concept that one could say IBM has emulated with the 3735, Burroughs has demonstrated the acceptance of a CPU-directed and connected terminal. Most of the units tallied up in this category are TC-500s or variations. (The TC-700 banking terminal, for example, is simply a TC-500 on stilts.)

The TC-500 is a forms-handling machine that gives its operator a choice of 16 applications, pre-programmed at the site in a special symbolic programming language. With a special set of indicator lights, the terminal leads the operator through the proper steps for filling out a form. At one moment, the TC-500 can be following the sequence to complete a format, adding a column of figures, printing, and communicating to a central processor. The device is definitely a terminal, however, and has a separate processor solely for communications functions.

It is definitely not a general-purpose computer. Its memory is limited to 1,280 words of 16 bits, and I/O capability is restricted to paper tape, cards, and various forms. The memory is much too small to do any real file processing. For a different reason, neither is the IBM 3735 a computer. It has a large memory, but cannot be programmed locally. Both devices depend on a host computer.

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WHERE ARE THINGS GOING, OR, HOW DO YOU PUT A LEASH ON JELLO?

It should be clear from above, then, that CPU-connected terminals are indeed intelligent, but they aren't computers. This distinction is not quite so clear in some of the other categories. The devices within these categories are shifting, and the categories themselves are in a state of flux. Here's a rundown on where things are now, and the direction they might go.

Mini-Processors

This concept for firmware at the data-entry level got a lift recently when Sanders Associates announced their 800 system at the DPMA show in Houston. Like the Viatron or Sycor systems, the Sanders system depends on a small "computer" to run CRTs, format data, pool tapes, and communicate with a central computer in a batch -- as opposed to on-line -- mode.

Even the Sanders system, though, is hard to confine to a single category. It can be a single CRT with its very own microprocessor, of a group of "dumb" CRTs being controlled by one smart one as a key-entry system. But it does illustrate some of the directions that micro-processor systems will be taking over the years:

- They can be built up to remote batch terminal status cheaply and easily, giving an RBT with little flexibility but with great cost-effectiveness to the user.

- Microprocessors built into key-entry systems can provide the extra power that changes them into processing centers instead of simple input stations.

- Properly configured, these systems can become 2741 replacements in a time-sharing system, relieving the central computer of many of its housekeeping chores.

Remote Batch Terminals

The key to these ITs is input and output. The remote batch terminal provides daily or hourly interaction with a computer system -- not immediate response. They are remote workhorses, providing a fair volume of card reading or high-speed printing away from the computer. The classic examples of RBTs are IBM's 2780, the CDC User 200, and Univac's 1004.

Independent manufacturers are beginning to configure plug-compatible replacements for these units . . . using minicomputers to emulate the older product and essentially fool the central computer into thinking it is talking to the original. But once the minicomputer is part of the system, the obvious reasoning goes, why not use it for more than peripheral and line control? These activities take only about 4K of memory, and most minis can provide far more. So as these units are delivered, it looks as if the death knoll for simple RBTs has sounded.

Mini-Based Systems

Because of the above, several mini-based IT systems of today are truly the result of efforts to get RBT business. Compat Corp.'s 88-23, for example, has the wide selection of peripherals typical of the independent RBTs; its inexpensive, fairly rapid Comfile random access memory and its facility for local programming

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have given it considerable success. Likewise, Atron's Datamanager and parent company Mohawk's 2400 series, Data 100's 78, and the Eldorado Electrodata 125 series, among others, are finding the same reception by sophisticated users. But these aren't exactly household brand names, and a lot of hand-holding will be required before flocks of users decide to switch their RBT operation into one more oriented to local processing.

In addition to the evolutionary RBT mini-based systems, there are a few that are truly designed as intelligent terminals. Two of them have received considerable attention, but neither is significant in terms of numbers . . . yet:

- Four-Phase's System IV-70 was first announced over a year ago as a terminal-cluster system whose central processor had internal characteristics equal to a 360/30. First deliveries were made this spring, and initial customers have been enthusiastic. The system's cost is so low that it is being shipped primarily as an IBM 2260 CRT replacement. But Four-Phase claims that terminal control uses only about one-third of the central processor's power, and sophisticated users such as Eastern Airlines are just beginning to use the remainder.

- This fall, Computer Terminal Corp. will begin deliveries of an advanced Datapoint 2200 intelligent CRT terminal that uses an MOS circuit developed by Texas Instruments. With logic, file registers, program and memory registers all on one chip, the processor will be inside a keyboard-CRT terminal. It relies on ROM (read-only memory), so programs will be hardwired. But 48K of this memory allows for a lot of hardwired programming, and 16K of random access memory will be available.

Other entries in this category are hard to find. For one thing, this level of processing power in a terminal really means a computer . . . used as part of a hierarchial network. IBM today provides System/3, System/7, and even some 360/20s to fill this niche; HIS has its 115 and GE-developed 58; Univac offers the 1004 and 1005; and some of the other smaller computers are being used in this fashion. Indeed, EDP/IR estimates that 1700 to 2000 small computers are being used in this fashion. And to the mainframe manufacturer, at least, it requires unusual strength of character to call these products terminals.

What it means . . .where it's going

It seems fairly obvious that, even as the intelligent terminals of today break down into four categories, two major themes are developing:

- On the one hand, IBM has decided to devote its attention to the somewhat intelligent terminal that must rely on a central CPU. In addition to offering IBM protection for its customer base, this approach has the important advantage of providing system protection. As more and more business and manufacturing functions become connected to a distributed information network, the security of the central system -- and the information it contains -- becomes vital.

- On the other hand, many users -- especially some of the more sophisticated users -- will want and demand the flexibility of a true terminal processor. They already have the skill to handle this, and can build the locks into the central system where it is necessary. These

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users -- ever since unbundling -- have learned that it is possible to get along without the omnipresent direction and assistance of the Gray Giant.

As the figures shown earlier indicate, the terminal equipment area is one of the fastest growing portions of the hardware marketplace. Today, about 25% of the 48,000 general purpose computers operate with terminals. By 1975, EDP/IR estimates this will rise to 35% of over 100,000 general-purpose CPUs.

How many of these terminals will be intelligent? Perhaps it would be just as valid to ask how we will define computer as 1979 comes closer. As we said two years ago (EDP/IR Mar.25,1969) in looking into the future, "redistribution of computer power to terminals and large complexes makes number counting a semantic exercise."

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"POS" LIVING COMES TO RETAIL INDUSTRY

Electronic point-of-sale (POS) terminals are another of the growing number of entry devices whose time has come (page 1). As far as the user was concerned, the concept lay in limbo ever since J.C. Penney dumped its multimillion dollar Tradar system in 1969. Then, last fall, NCR gave POS the seal of approval with its Model 280 terminal (EDP/IR Oct.28,1971). Now the country's largest retailer -- Sears, Roebuck & Co. -- has given the go-ahead through a large POS order with Singer.

The market for POS terminals is large because the device essentially substitutes for the traditional cash register. A POS system may be just the terminal itself, controlled by its own hard-wired logic, or it may consist of a number of terminals tied into a minicomputer in the back of the store. The system operates off-line, for the most part, as it records sales transaction data and later transmits it, in batches, to the company's main computer center. For credit checking, however, many terminals operate on-line to central credit files. The mini, if there is one, does some amount of local data manipulation and reporting, and it is the communications middleman between branch store and downtown EDP center.

There has been quite a bit of POS activity lately, and it involves both the major POS manufacturers and several major retailers:

- Sears, Roebuck has signed a five-year, multimillion dollar agreement with Singer for POS systems that likely will include some of Singer's System/10 computers. Sears also plans to buy POS equipment from another major supplier, although it won't name names. And neither party will disclose how large the contract is, although a Sears spokesman labels as "highly incorrect" the $50 million sum reported in trade journals.

- Litton Industries' Sweda International Division entered the fray in April with its Series 700 system. (Sweda is Number Two, after NCR, in the cash register market.) Sears has been testing the Sweda terminal in Louisville, so Litton looks upon Sears as a prime prospect.

- NCR's big announcement to date concerns an order from Montgomery Ward for 1500 terminals. The big retailer, reflecting the general desire for a second source of supply, has given Singer a letter of intent for 665 POS terminals. And other department store chains are in various stages of testing or ordering. Penney's, for example, is interested once again and will start testing NCR units just in time for Christmas.

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So even though NCR once could consider the cash register market its private hunting preserve, and even though NCR "means computers" . . . competition in the computer-related POS terminal area is shaping up to be fierce. Between the Montgomery Ward order and one from The Hecht Co., NCR has announced contracts for over 2,200 units; it will say of its total backlog only that it is substantial. Singer/Friden expects to ship some 4,000 units during the rest of this year, including units for Sears and 400 terminals for Singer's own stores.

Pitney Bowes-Alpex tells EDP/IR that it now has POS terminals at six full-store installations. Its business will boom if Bloomingdale's goes ahead with plans to implement POS for all its stores, using PB-A as the supplier. Olivetti, the Italian-based company with primary POS strength in Europe, is angling for a contract with Alexanders of New York.

Other smaller companies have already jumped into the contest. If they net a 500-unit contract from a moderately big chain, it can mean $1.5 to $2 million. They tend to concentrate on big local buyers such as the fashion department stores in Southern California, where many of them are located.

- American Regitel offers a credit checking terminal that could act as a shoehorn for sales of its compatible POS terminals. It has both kinds of equipment installed at Bullocks, a leading California store.

- Ricca Data Systems has chalked up orders and start-up installations at The May Company and Broadway, in California. It markets a data collection unit to supplement, rather than replace, cash registers.

- Information Machines Corp. aims its hard-wired standalone units at retail chains that need only a few registers for each store. The total order from one chain could be for a hundred or more terminals.

Cash registers tend to be purchased, and POS terminals are expected to follow suit. This is great -- especially for smaller companies -- once the orders come in. But in many cases it could be a hindrance to sales, since the manufacturer will have to convince retailers to speed up replacement of their perfectly good, paid-for registers. New stores, or course, will be much more receptive.

Nevertheless, the point-of-sales area is growing fast. NCR expects POS systems to account for more than a third, by value, of the total cash register market by 1975. That company estimates 1970 cash register sales, by all suppliers, at $180 million for the U.S. However, about two-thirds of the registers are used by food stores, restaurants, and other retail outlets which aren't considered to be good POS prospects. Supermarkets may eventually use electronic checkout, but that's another story.

The large orders currently in the news fit right into company-wide bookkeeping and information systems. They will save money, it is assumed, on a total systems basis. Interestingly, the only major computer manufacturer into the POS business -- NCR -- can't reap the entire benefits of such systems, because while it understands the front-end problems of the retailers, it doesn't offer the large-scale computers that big chains will need.

Of course, IBM does. So meanwhile, back at the ranch, you can't help wondering how IBM might adapt its System/7 (EDP/IR June 25,1971) to but yet another area of business where remote information must be funneled into central CPUs.

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E|D|P industry report

• THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" JULY 23,1971 • VOL.6,NO.18 P.J.McGOVERN,EDITOR

Computers for the masses?

MANY COMPANIES ARE OUT TO HOOK NEW SMALL BUSINESS COMPUTER USERS: IBM IS! A FEW OTHERS ARE TRYING; BUT HONEYWELL HAS MOUNTED A FRONTAL ATTACK

In what looks like a three-pronged approach, Honeywell Information Systems is making lots of noise about the small business computer market. This is about the only spot in the IBM stable that is up for grabs. Other companies -- quite a few in number -- are whimpering about products in this area (as IBM calmly signs up over 400 new customers a month), but they aren't making much of an impact. To date, IBM has over 90% of the small business computer market, any way you measure it.

But things might change . . . slightly. Once upon a time -- and a very long time ago it was (1963) -- Honeywell puffed a breath of fresh air into the computer industry. Almost half a year before IBM disclosed its new product approach with System/360, Honeywell announced the H-200. This computer was an "upstart's" way of taking dead aim on the most populous and vulnerable part of IBM's installed base: the 1401. The H-200 featured a 'liberator' that provided "painless" conversion to a more powerful system at similar monthly rental. Honeywell was quite successful, and its success was boosted even further when:

1) IBM users began to vocalize their complaints about conversion between second-generation computers and early 360s; and

2) Honeywell disclosed that the H-200 was really part of a family, too. Upgrade, said Honeywell, would be no problem.

It wasn't. And in its own way, Honeywell's 200 series established an even bigger success story than IBM's phenomonal results with System/360. IBM "simply" proved it could continue to dominate the computer industry; Honeywell proved that a newcomer, with a good idea, could pick up as much market share -- at the time -- as it could handle financially. The rental business has high startup costs.

Now, Honeywell seems to have consulted the history books. Still expanding its original 200 family downwards (and implying with each passing event that its New Series -- whatever it is -- will be compatible), the Number Two company has

- Announced a Model 105, lowest priced member of the upward-compatible and evolutionary 200 family;

- Announced Liberator/20, a free software package that moves IBM 360/20 users over to the HIS fold with no problems attached.

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As if this weren't enough, HIS is drawing even more guns to bear. Last year, it began marketing the French-developed G-58 small business computer here in the U.S., and -- apparently following the lead of IBM with its Basic Systems support centers -- HIS has set up 12 small computer service centers across the country. Customers for these small computers (they rent for $1,500 to $2,000 a month) can go to those centers for seminars, debugging help, and other services.

Finally, Honeywell is offering an entry at the intelligent terminal level. Just last week it announced the availability of Models 5, 10, and 15 of the 100 series (developed by GE) for the U.S. market. The 5 and 10 are essentially batch terminals -- with up to 12K bytes of memory -- that rent for $838 to about $2,000 a month. The Model 15 is a batch system, that can also be used as a terminal, with rentals starting at the $3,000-a-month level . . . comparable to the larger System/3s and the new HIS 105. The biggest difference between the 15 and HIS's other small offerings is its 8-bit word structure.

Who's really in the small computer business?

Funny thing. IBM is the only company bringing any significant number of "net new" users into the computer community, and a large majority of these new users are really IBM converts from punched-card (EAM) equipment. During the first half of this year, IBM shipped more System/3s than it installed during all of 1970, and its U.S. base of 360/20s edged up to the 8,600-level. As a result, about one-third of the general-purpose computers in the U.S. -- some 40%, by number, of IBM's domestic base -- are small IBM computers.

In addition to being the most populous, this base appears to be the most fickle. Defections stand out, and as a number seem large; as a percentage, however, they are really in line. The situation could change, of course, once a force such as HIS enters the scene. At present,

- NCR started out like a tiger, and installed over 1600 Century computers. But things have changed with time, and NCR's newest entry -- the C-50 -- simply isn't moving in the marketplace.

- Singer/Friden has installed almost 300 System/10s (over 50 to intra-company locations, however), but its hopes for real success would seem to hang on deliveries of point-of-sale devices (EDP/IR June 30,1971).

- Scores of other companies have announced products in the small business area, but few of them are even delivering . . . much less in any sort of quantity.

- Even Honeywell, with its three-pronged attack on the small business marketplace, primarily seems to be letting IBM set the first hooks. The philosophy could pay off well -- as it did in the past -- but it means that IBM is the only force adding new users.

Just how many computers can there be?

IBM is indeed a large force. It has several hundred thousand punched-card machines, a growing number of Magnetic Tape and Card Selectric users, and untold numbers of other potential customers who use IBM typewriters and/or dictating equipment. It is well established in small and large businesses. Measuring future demand is difficult at best, but a look at where we are can provide helpful clues.

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On a percentage basis, small business computers haven't really found their way into very many installations. To illustrate this, the International Data Corporation, publisher of EDP Industry Report, has examined its U.S. Computer Installation Data File to estimate the distribution of System/3 computers. The 3500 of these computers installed at mid-1971 were then apportioned according to the size of site where they are located. The relative distribution is as follows:

U.S. DISTRIBUTION OF IBM SYSTEM/3 COMPUTERS BY SITE SIZE

Employees per Site	Number of Tax Reporting Units*	No. IBM System/3	% Penetration
1-20	3,092,600	360	0.012
21-50	252,021	515	0.21
51-100	84,443	645	0.77
101-250	48,104	880	1.83
251-500	15,343	690	4.4
501 +	10,942	410	3.7

* 1968 data from 1970 Statistical Abstracts, U.S. Dept. of Commerce

If nothing else, these numbers certainly illustrate the potential for small computers or intelligent terminals. They obviously don't explain the technique for tapping this market, or the amount a given prospect will pay for some degree of on-site computer power.

For one thing, there is no typical user of small business computers, and the use of these devices varies considerably by industry. In its analysis of the System/3 user base, IDC found several variations in the use of these small computers and the use of general-purpose computers across the board. For example,

- Airlines, communications carriers (primarily AT&T), and the Federal Government -- with 12% by number (even more by value) of the computers in the U.S. -- are not using System/3. These large computer users apparently have decided they must have equipment that is 360-compatible.

- Banks, chemical and petroleum companies, and educational institutions have moved to System/3 in only a minor way. These types of organizations have over 18% of the general-purpose computers in the U.S., but only 6% of the System/3s in use today.

- More than half the System/3s are located at industrial companies (vs. only 38% of all general-purpose computers), and almost half of these are at companies IDC categorizes as "other manufacturing," notably smaller shops of the "momma-papa" variety.

- There is a significant penetration of System/3s in hospitals and non-profit service organizations. And the single largest area of penetration for System/3 is in the wholesale sector (SIC 50); over 10% of all System/3s in the U.S. are being used by these middlemen.

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The System/3 user base -- large and growing as it is -- is not financially important to IBM at present. Virtually all of them are out on rental; their revenue flow of "only" $5 million to $6 million a month is not yet contributing to profit; the small computers are relatively the most expensive in the line to sell and service. System/3's importance to IBM is its upgrade potential.

Worldwide revenues from 360/20s, for example, are eight-to-ten times as much as those from the System/3 base, and 360/30s bring IBM about twice again each month the rentals paid by 360/20 users. This is why it is important for IBM to introduce computers to as many people as possible . . . and to upgrade these customers as rapidly as possible. It's also why companies such as HIS are trying to take advantage of IBM's initial sales efforts.

Honeywell's frontal attack on the 360/20

A number of situations in the marketplace today make the timing of Honeywell's latest major move -- its decision to "liberate" an established IBM product line -- quite significant.

- On the one hand, the move comes at a time when IBM's hold on its 360/20 base shows a few signs of slipping. The 20 has long been considered at best a second cousin to the 360 family; there is no clear System/370 upgrade for the 20, even though IBM recently announced free software that runs 360/20 programs on the 135; EDP/IR's latest user surveys indicate that 40% to 50% of 360/20 users currently planning system changes are going to move to a System/3.

- On the other hand, Honeywell's latest computer -- the Model 105 -- is just a modified version of older 200 series computers, so salesmen will invariably have to answer questions such as: "Why should I switch over to an aging family now when you will have something much newer in another year or so?"

The first consideration above is fact; the second merely speculation. HIS spokesmen say the 105 is "competitive with the IBM System/3," is a fully compatible member of the 200 family, and is "the fifth low-cost, high performance computer to be added to Series 200 in the last 18 months." In announcing the 105, HIS talked about its "marketing campaign in the U.S. to convert IBM 360/20 users to faster and less expensive Honeywell computer systems." Most competitive comparisons provided salesmen, however, show how the 105 stacks up against various configurations of IBM's System/3. So it looks as if Honeywell expects large numbers of 360/20 users to move in the S/3 direction.

To make it an easier move, HIS is offering two software packages: Liberator/20, which it says will automatically convert 360/20 RPG programs into Honeywell programs, and its own RPG compiler that runs these converted programs at faster speeds on any small 200 series computer. After the switch, Honeywell also points out, the user can take full advantage of standard Cobol, and has a "growth path to larger and more powerful systems without reprogramming."

An entry-level Model 105 will lease for $1,641 per month on a three-year contract ($1,697 for one year) or sell for $95,140. This system includes a CPU with 16,384 characters of main memory, line printer, 80-column card reader, and 9.2 million characters of disk storage. Memory can go up to 32K, disk capacity to 27.6 million. First deliveries begin in the fourth quarter of this year.

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Is there really a chance for entry-level business?

As pointed out above, Honeywell's technique for new computer business -- in addition to upgrading its own customer base, of course -- is to go after people already using IBM computers. Also, it has been relatively successful in another way: Placing computer equipment with companies that started out relying on service bureaus. Here again, however, we have the "almost new user" concept that has worked well for Honeywell for several years.

Two other suppliers of general-purpose computer lines as well as traditional business-oriented products have their work cut out: They must upgrade existing computer customers and try to take advantage of their other base:

- Burroughs apparently keeps its customers happy with accounting equipment until they are ready to pay a $4,000 to $6,000 monthly computer bill for a B-500 or B-2500.

- NCR, even though it has a broad business base, hasn't done too well recently with its computers. When the C-100 was at its peak, only one-third of the orders came from non-computer users. And lately, for some reason, shipments of the C-100 and the newer C-50 are going quite slowly.

The other major mainframers have slightly different characteristics. Univac has an entry-level computer in the 9200, and has done quite well with this product even though it didn't take full advantage of its prior small-user base built around the 1004. Control Data sees terminals connected to large computers as the entry-level approach, and could well be right. To date, however, it simply hasn't been able to sell the concept in enough quarters. RCA is selling head-on against IBM's most entrenched customer base, and says it is making inroads at mixed-system sites. But it would seem to EDP/IR that RCA needs smaller computers -- or an intelligent terminal line -- if it is going to meet its announced goals.

And companies such as Friden -- that don't have an upgradeable product line -- may find the entry-level computer business rough going, especially if they attempt volume deliveries. This is primarily a rental business, new to most manufacturers. On the other hand, if they proceed with restraint, some companies could discover that margins here are larger than in more traditional areas. What will probably be required, however, is a product line that is compatible with larger offerings of the mainstream mainframers.

What will the leader do?

During the two years since IBM announced System/3 (EDP/IR Aug.6,1969), it has clearly demonstrated that it can create demand for computers among small business users. At the time of the announcement, we estimated that IBM could possibly ship 20,000 or so of the new system. And with 4,000 out the door in only a year-and-a-half of shipping -- 2,500 of them during the first six months of 1971 -- we see no reason to change our estimate.

But there are still those 3,000,000 or so small businesses here in the U.S., and we think that IBM has plans to penetrate more than a fraction of one percent of these establishments. Of course, it is already represented at quite a few with typewriters and dictating equipment, and it recently announced communications capabilities for its Magnetic Card/Selectric Typewriter. Maybe there's a System/1 in the wings somewhere!

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IRS HAS 20/20 VERSION -- OF TAX RULES, THAT IS

Last month the Treasury Department gave business a tax break. It liberalized depreciation rules so that companies buying capital equipment can use depreciable lives that are 20% longer or shorter than IRS guideline lives. The regulation applies to equipment put into service after January, 1971.

The Government's aim is to boost capital spending. But it appears to EDP/IR that the new tax regulation will have little, if any, impact on computer buying decisions. It's not enough to tip the scales for leasing companies reluctantly eyeing the 370 market, except perhaps in a few marginal cases. And the same goes for users -- a few thousand dollars in deferred taxes (which have to be paid eventually anyway) isn't a very significant factor in the decision to rent or buy a million-dollar computer.

But the more flexible tax rule does give financial officers and CPAs another tool in their Do-it-yourself Tax Deferment kits. And leasing companies and mainframe manufacturers -- if not users -- are figuring out how to use it.

The IRS guideline life for a new computer system is ten years. If a buyer, or manufacturer with computers on rent decides to shorten that life by 20% for tax purposes -- thus paring today's taxable income -- he postpones some of his tax payments for several years. In other words, he gets an interest free loan, courtesy of Uncle Sam.

There's one catch. You must have taxable income to do this. Companies with current losses or loss carry-forwards from the olden days have nothing to gain by deferring taxes they wouldn't pay anyway. So they may go the other route -- use a 12-year depreciation life and pay less taxes later on. Several leasing companies are possible candidates for this strategy.

The 20/20 rule is under fire from "Nader's Raiders" and others, and it is likely to be challenged legally. In the meantime, for some computer lessors and manufacturers it will go a little way toward beefing up current tight cash flows, and for others it may trim long run taxes relative to what they would have been.

Business briefs

RCA, in what could be its first step toward developing its international computer business, has established a computer marketing and technical support operation in the United Kingdom. Under the direction of yet another ex-IBM executive, RCA will be marketing and supporting its new series of computers. No manufacturing is planned at present.

About 30 people are involved in the operation at present, and RCA says this number could double by the end of 1971. The operation will be headquartered in London, but it includes a number of British individuals who "will be stationed in important northern and midland cities as well."

IBM, apparently continuing to come up with every way possible for delivering equipment as rapidly as possible, has introduced a lower-priced model of its 1130 computing system. Designed for "economical entry into scientific and problem-solving data processing applications," the Model 4 comes with either 4K or 8K words of main memory. It is said to offer approximately 70% the performance of comparable existing 1130 configurations and will rent for $1,090 -- about half the price of the older offering. First customer shipment will be September 1971.

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IBM GENERATES A FLURRY OF "FIRSTS"

As should be expected about a year after major system announcements, IBM and its customers seem to have "firsts" popping out all over. In addition, the giant computer manufacturer has recently made an announcement or two of note. So for general information, and later reference, EDP/IR has put them all together:

- The first System/370 to be delivered, a 155, was installed with great fanfare at Zayre Corp. headquarters near Boston on Feb. 4. Eventually, it will replace a 360/40 and a 360/50; ironically, it's on a full payout lease and uses some independent peripherals.

- The first 370/165 became operational on June 7, 1971, at State Farm Mutual Automobile Insurance Co. in Bloomington, Ill. It is now being used to process more than 2 million policyholder records.

- On June 18, 1971, IBM installed its first 360/22 (a stripped-down 30) at Accountant's Computer Services in Nashville. The system went up after only 2-1/2 hours, and the user claims it saves some $2,000 a month running two shifts a day.

- McDonnell Douglas Automation Co., on July 6, became "the first firm to install IBM's largest, most powerful computer -- the Model 195. It joined wires with 105 computers, valued at $165 million, at the company's one-acre computing complex in St. Louis. Interestingly, just a few days before, on June 28, IBM announced that come mid-1973 a 360/195 could become a 370/195 -- with an expanded instruction set -- for only $4,000 more a month.

- On July 8, 1971, Stanford University became "the first customer to install the IBM System/370 Model 145, the company's first all-monolithic computer." It will be used in Project INFO, a three-year development effort "to streamline university decision-making. It is to be the hub of a futuristic university management information system that will begin operations later this year."

During the same time period, there were two other announcements probably more significant in their implications than in their exact statement:

+ In almost a break with pre-established concepts, IBM announced on July 14 that System/7 could have a disk memory, the 5022, that appears to be at least a cousin to the System/3 disk drive, and to use the same disk pack. Along with this announcement, IBM quietly stated something we reported earlier (EDP/IR June 25, 1971): "First customer shipments of System/7 itself begin this September, two months ahead of the schedule previously announced." The 370/145 was early, too, so those semiconductors roll out.

+ Quietly last week, with no press release, IBM informed salesmen and customers that the 370/135 could have more on its floppy disk than previously announced. First, IBM announced that the Integrated File Adapter would now handle up to eight 2314-type spindles; second, it offered for free a 360/20 compatibility feature that allows programs for the 20 to run on the 135 under DOS; third, it increased the number of multiplexer subchannels to 128 or 256 and eliminated the need for a control unit when using the 2711 multiplexer. Quite a bit for no official announcement!

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NEW REGISTRATIONS BY COMPUTER COMPANIES

[Listed below are brief descriptions of proposed security offerings, from firms in the data processing field, that are currently in registration with the Securities and Exchange Commission. The preliminary prospectus for any issue may be obtained from the underwriter.]

COMPUTER IMAGE CORP.

Computer Image Corporation, 260 S. Beverly Dr., Beverly Hills, Calif. 90212, which produces a computer system for generating animated images, on May 17 filed 150,000 common. The proceeds, at $18.50 per share maximum, will be used to purchase electronic equipment and for other corporate purposes. The underwriter will be Boettcher and Company, 828 17th St., Denver, Col. 80202.

COMPUTER MACHINERY CORP.

Computer Machinery Corp., 2231 South Barrington Ave., Los Angeles 90064, which manufactures DP equipment, on June 14, filed 1,200,000 common, including 350,000 outstanding. Of the proceeds, $7 M will be used to finance costs associated with products which the company leases to customers, and the balance for other corporate purposes. The underwriters are headed by Merrill Lynch, Pierce, Fenner & Smith, Inc., 70 Pine St., New York 10005, and Sutro & Co., Inc.

DATA GENERAL CORP.

Data General Corp., Route 9, Southboro, Mass. 01772, a minicomputer manufacturer, on June 17 filed 450,000 common, of which 200,000 are offered by the company and 250,000 (being outstanding) by the holders. Proceeds, at $48 per share max., will be used for general corporate purposes. Underwriters are headed by Bache & Co., Inc., 100 Gold St., New York 10038.

ELECTRONIC DATA SYSTEMS CORP.

Electronic Data Systems Corp., 1300 EDS Center, Exchange Park, Dallas, Tex. 75235, a facilities management company, on May 27 filed 69,962 outstanding common. The shares may be offered for public sale from time to time by the holders at prices current at the time of sale ($60 per share maximum).

GRI COMPUTER CORP.

GRI Computer Corporation, 320 Needham St., Newton, Mass. 02164, a minicomputer manufacturer, on May 27, filed $2.2 million of 7-1/2% convertible debentures. Proceeds will be used for working capital and other corporate purposes. The underwriters are headed by Newton Investment Corp., 141 Milk St., Boston.

RAYTHEON COMPANY

Raytheon Company, 141 Spring St., Lexington, Mass. 02173, which makes electronic systems and equipment, on June 10, filed $50M of sinking fund debentures, due 1996. The proceeds will be applied to reduction of short-term borrowings, increased for working capital requirements, expenditures for plant and equipment, and the 1970 repurchase of the company's common stock. The underwriters are headed by Morgan Stanley & Co. Inc.

XEROX CORPORATION

Xerox Corp., Stamford, Conn. 06904, on June 18, filed 18,502 outstanding shares common. These shares may be offered from time to time by the holders thereof at prices current at the time of sale ($107.375 per share maximum).

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E|D|P industry report

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"THE GRAY SHEET" JULY 30,1971 • VOL.6,NO.19 P.J.McGOVERN,EDITOR

Rookies crash the league

40%-50% GROWTH PROJECTED FOR DATA CARRIAGE AND INTERCONNECTION GEAR AFTER FCC DECISION KICKS OFF DATA TRANSMISSION FREE-FOR-ALL

The "look-alike independents" will once again be trying to score with U.S. computer users. But this time, the gutsy newcomers will be microwave carriers, and the giant being challenged is AT&T. Relax. The hoopla won't commence before 1974, by which time the two biggest new systems should both be in service.

On May 25, 1971, the FCC announced a unanimous decision which has thrown open the market for data (as well as leased-line voice) transmission. It says that any qualified firm may provide public communications as a specialized carrier. This means a turn at bat for Microwave Communications Inc. (MCI), UCC's Datran, and other prospective microwave carriers. To chalk up a hit, though, they will have to convince computer users they have a service clearly cheaper and/or clearly better than that of the old pro, Mother Bell. Like the independents vis-a-vis IBM, MCI and Datran will be extremely vulnerable to competitive reactions by AT&T.

- Data transmission has been exploding at a rate of 40-50% annually, from a very small base. This year it accounts for less than 2% of communications revenues -- a drop in the bucket. Over the next four years the drop will multiply to over 5% of the total, or $1.8 billion.

Two new sectors are being spawned, with the permission of the FCC. They are: specialized common carriers (of voice and/or data communications); and independent suppliers of interface equipment (modems, multiplexors, and concentrators).

- For the would-be specialized carriers, the FCC's decision is just a hunting license. They will still face major obstacles . . . the biggest, obviously, being AT&T. Bell will be allowed to cut prices in order to compete "fully and fairly" with the new carriers.

- The end-user market for interconnection gear should surge at over 40% per year from its 1970 $150M base. AT&T will supply most low-cost modems; the independents will have to track OEM contracts, sales of big-ticket items to users, and later, MCI and Datran buys.

This issue outlines the opportunities and problems facing these two groups of companies. The data is based on a report by the Corporate Planning Service of International Data Corp., publisher of EDP/IR. The next page gives an overview of the penetration of communications into the world of electronic data processing.

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One out of four CPUs are communications-oriented

Only a little over 25% of general purpose computers are being used even partially in communications applications this year. Whether that's a lot or a little depends on whose book you've been reading. With IBM definately pushing the communications environment, by 1975 this proportion will hit 35%. And this understates the case, since by then, IDC predicts, 60% of computer renting for more than $5,000/month will be used in some kind of communications application.

Last year's squeeze highlights the rise of communications. In 1970, most computer users were carefully watching their budgets. But data communications line and equipment spending was up about 40%. The table below shows EDP/IR's estimates for the high growth rates of data communications line charges and interconnection equipment, and the somewhat slower -- but impressive -- rise in terminal spending.

DATA PROCESSING VS. DATA COMMUNICATIONS
($ Millions of User Expenditures -- U.S. Only)

Year	Computer System Hardware	Terminal Hardware	Interconnection Equipment	Carriage of Data
1968	$ 4,250	$150	$ 75	$ 135
1969	5,100	195	110	290
1970	5,600	250	150	280
1971	6,200	330	215	405
1972	7,200	445	300	600
1973	8,275	590	425	875
1974	9,450	775	600	1255
1975	10,750	975	850	1755

As the table indicates, data transmission revenues are soaring, but from a small base. Nobody (not even AT&T) knows exactly what portion of communications revenues come from data, but IDC has made estimates that other experts seem to agree with: From just over $400 million in 1971, data transmission revenues are expected to hit $1.8 billion in 1975 -- a big number, but a not-very-dramatic 5% to 6% of the expected communications carriage total.

The dial network accommodates low-speed data terminals, including the ubiquitous Teletype. From user surveys and estimates of the number of terminals in use, IDC estimates that data revenues over the voice network will hit $105 million this year. So despite the ads, this isn't much business for Bell.

The voice/data split on dedicated leased lines is also hard to pin down, since many companies use leased lines for both . . . voice by day and data by night. As the chart shows, IDC expects this type of service to account for roughly $300 million in 1971. Adding these up -- and looking out to 1975 -- it looks as if the specialized common carriers can expect $150 million to $200 million if they can grab 10% of the market. Their prospects are discussed in the following sections.

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THE DATA TRANSMISSION MARKET

The Federal Communication Commission's decision is merely a pat on the head and permission to enter the game for the specialized carriers. It doesn't provide them with any "protective umbrella." The question is, will Mother Bell?

There are some obvious parallels between the situation of the prospective carriers up against AT&T and the situation of the independent memory makers up against IBM. Many of the marketing problems are the same, and so are the targets. In communications, as in computer equipment, users basically don't want the confusion of multiple vendors and, to start out at least, they consider independent offerings guilty until proved innocent. But the biggest users are willing to be convinced.

However, the analogy has its limits. After all, communications will continue to be subject to regulation right down to specific tariffs -- when the FCC has time -- and the Justice Dept. can hardly cry monopolist on a company when administrative policy has historically ordained for it nearly that position.

And AT&T could turn out to have a "threshold of pain" considerably lower than IBM's fabled 10-12%. Although only a few percent of its business is being challenged, Bell has fought tooth-and-nail against permission for the independents to enter even this small sector. Its possible market tactics are discussed later.

What's in the independents' bag

In the computer industry, independent disk and tape drive vendors touted performance, but they mainly got their footholds through 15-20% discounts under IBM prices. In the communications area, however, users may be sold by performance characteristics or by factors indirectly related to price -- as well as by price itself. An IDC survey indicates that cost is just one gripe of communications users (who, by the way, are in general remarkably satisfied). They also object to:

- the high cost of using modems
- high error rates
- long delays in getting leased lines and certain types of equipment
- the limited availability of transmission speeds
- the tariff structure (geared to voice rather than data)

Data Transmission Co. (Datran), the MCI group, and several other companies aim to change all that by offering transmission services tailored more closely to the data user's needs. The MCI and Datran networks, described below, are of two basically different types. (See EDP/IR Dec. 31, 1969 for more details.)

- Datran's switched end-to-end digital network will cost an estimated $350M to construct, and the company says its initial 35-city system will be in operation by early 1974. So far, there's no news on how the UCC subsidiary will finance construction, except that UCC will be a "major factor." An announcement on this crucial point is due soon.

- The MCI companies will offer point-to-point voice and data communications over leased capacity. One link is already up and running, on a test-out basis, between Chicago and St. Louis. The company has

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said it will probably start service in the Northeast in about a year. Over half the MCI companies are fully financed; the others are in the process of arranging additional financing to cover their equipment needs, according to a company spokesman.

- Five other companies have applied for systems ranging in estimated equipment cost from $12.5 to $26.5 million. They are: Southern Pacific Communications Co., United Video, Western Tele-communications, Inc., Nebraska Consolidated Communications, and New York Penn. Microwave Corp. Several others propose smaller systems.

All the applications together stack up to an estimated equipment cost of nearly $600 million, for over 1900 microwave stations.

There's just one nut left to tighten in Washington: the FCC must approve individual site applications before construction can start. This requires hashing out technical details so that transmissions from new microwave towers don't interfere with existing routes. For all practical purposes, though, the regulatory battle is won. What remains is the marketing battle . . . and that will be tough, considering that the main opponent, AT&T, has a near-monopoly in communications, $17-billion a year in sales, and a far stronger entrenchment in its field than IBM ever had in computers.

Gulliver vs. the Lilliputians

Something else that had better be in the independents' bag is aspirin, because the next few years hold plenty of potential headaches. AT&T, whether in its role as supplier of local connections or as competitor, is the likely cause.

The coming match will be staged under new rules for the regulated communications field. The White House, the FCC, the prospective new carriers, and even Mother Bell all seem to agree that "full and fair" competition is in. (AT&T said at one point it was "pleased" with the Commission's decision.) But when it comes down to calling specific AT&T moves, they probably won't all agree on how to tell "full" from "foul" from "fair." The FCC will face the tacky problem of spelling out just what kind of pricing is allowable. Its decision mainly set broad guidelines.

However, one important policy switch specified: the Bell System will be allowed to selectively cut prices where necessary to meet competition -- i.e., over the high density routes which the specialized carriers plan to serve. This is a split from the traditional nationwide rate averaging requirement. Rate cutting is just one competitive tactic available to AT&T. For another, it can write more flexible tariffs, for instance allowing more sharing of broadband channels. (One such tariff is already in effect in a few states -- the Series 11000.)

In addition, AT&T has said it will offer an end-to-end all-digital switched service for data users by 1973-74. Bell officials won't give out details, but the proposal looks remarkably like Datran's concept.

Knocking for a local loop

Another possible hitch is in getting connections between trunk routes and customer sites. To start out, MCI and most of the other specialized carriers will get local loop service from their favorite competitor, The Telephone Company. Bell has agreed to interconnect, but it hasn't set tariffs. A high price, possible

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delays in installation, and the need to have additional modems to interconnect with AT&T local loops could all combine to outweigh the advantages of going to the specialized carriers in the first place.

On the other hand, if the new carriers want to build their own local distribution facilities, they need permission from state regulatory commissions. As a recent Computerworld article points out (in the July 28, 1971 Communications Supplement), this approval may not be easy to get.

Datran says it plans to provide its own local services in its initial 35-city area. In other areas, it will interconnect with telephone company lines, but only if they meet certain quality standards.

Turning to the stands . . . one fan club of the specialized carriers should be the makers of communications interconnection equipment, discussed next.

OPPORTUNITIES IN INTERCONNECTION EQUIPMENT

During 1970, independents supplying interconnection gear shipped about $75M worth, of which about $60M was sold outright. At the same time, the telephone companies garnered some $90 million of rental revenues. And the total value of shipments was about $260 million. There are three main equipment categories:

Data sets, or modems. When you check out the picture in modem advertisements, you see a black box that is fantastically the same. Here lies the problem -- technology which is easily available, not much differentiation, and upwards of 80 companies competing. Most users are familiar with only four or five: Western Electric (AT&T), Sylvania (GT&E), Rixon (United Utilities), Milgo, and GE. It's belaboring the obvious to predict a shakeout.

Data sets provide most of Bell's interconnection equipment revenues; it delivered about $175-million's worth last year. The independents shipped about $45M, including acoustic couplers. The carriers will continue to supply end-users with most of their low-speed modems; the independents' best bet for end-user sales are high-speed (higher cost) modems, and they will aim at OEM contracts.

Multiplexers are a big-ticket item that produced $10-$15 million in shipments last year. Shipments will probably grow at about 40% a year, but so far only a few independents have hooked into the end-user market.

Concentrators are another high-priced item, typically based on a minicomputer. In 1970, they accounted for about 7% of the $285 million of dedicated application computer shipments. Mini makers, specialized communications manufacturers, and systems houses will all take a crack at this sector, which should grow at 50%/year.

By the mid-1970s, the new carriers will be a good OEM market for interconnection gear. They don't plan to make their own. They will start by buying low-speed modems, and, later on, more high-speed modems, multiplexers, and concentrators.

Stumbling blocks

The story with communications interface devices is, again, something like the plug-to-plug compatible memory saga. Independents do most of their business with a few large users. The best targets are airlines, time-sharing and other remote

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computing firms, government agencies, universities, and some huge corporations. The giant users have been fairly willing to put in independent equipment.

But as the independents go down the Fortune lists for prospects, they will find it harder and harder to talk the communications expert into trusting the reliability of the equipment and into introducing another vendor onto the site. Especially if the communications expert used to work for AT&T, and a good many did.

Life would be so simple if the independents' only problem was persuading end users. But there are other complexities. One is that their modem market -- OEM and end-user -- may fizzle if computer terminal manufacturers decide to include the data set (by this time not much more than a plug-in card) in the terminal and make it in-house. Eventually, more and more functions of multiplexers and concentrators may also be incorporated into the computer system as well.

A minor source of hassle is AT&T's tariff provisions on interconnection of equipment to its lines. Of course, the big battle for allowing foreign attachments has been won. Bell only sets standards and requires a simple network protection device, the Direct Access Arrangement (DAA), on the switched network. Independent equipment makers consider the DAA unnecessary and a nuisance. Some modem makers are forming an association which will protest a pending AT&T tariff which, starting in August, would require protection for private leased lines as well.

THE REGULATORY GAME: THREE DOWN, TWO TO GO

The Federal Communications Commission actually raised five issues concerning the entry of specialized carriers into communications. It settled the first three and put off decision on the last two. They are summarized in the box, below.

ISSUES RAISED BY SPECIALIZED CARRIER APPLICATIONS

A. Should new carriers be allowed into the specialized communications field? If so,

B. Should the FCC hear claims of "mutual economic exclusivity" by companies applying to build links in specific localities?

C. What rules should the FCC adopt concerning certain technical matters involving interference and use of the frequency spectrum?

D. Should potential customers for the specialized carriers get some kind of protection re quality and reliability of service?

E. What is the appropriate means for local distribution of the new carriers' services?

The Commission's May 25 decision is a significant step toward bringing competition into communications -- an industry which has traditionally been a regulated monopoly, or near-monopoly. Indeed, it's probably the first time public communications in any major country will experience anything resembling competition.

One force which appears to be pushing the idea of more competition for communications is the White House. Significantly, it has been taking more of a lead in proposing policy. Of course, the place where the buck stops is still the FCC.

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How does the two-month-old decision bear out the new spirit? Here are some quotes that give a clue as to the FCC's plans, but some important questions have been explicitly or implicitly ducked. For example, the FCC will tackle costing specialized services only on a case-by-case basis. Also, it has not said whether it would limit overall profits of the new carriers.

Competition. The FCC set forth a general policy that favors the entry of new carriers into specialized communications. And it shot down any idea that these new systems would be any real threat to Bell. The FCC says there is . . .

> . . . no reason whatsoever to assume that the applicants would divert all or even a substantial portion of that comparatively small percentage of existing and projected Bell System business that is vulnerable to competition . . . MCI anticipates only about $55 million in total annual revenues from all the MCI systems covered by applications . . . Datran's proposed plant investment is only about $350 million . . .

. . . compared to AT&T's billions. Indeed, the decision stresses that there will be competition from the old carriers as well as from newcomers.

> Existing and new carriers shall have an opportunity to compete fairly and fully in the sale of specialized services . . . There is no reason to deny the public the benefits that may derive from active and vigorous participation by the Bell System and Western Union in this market . . . Moreover, we subscribe fully to the [views] that there should not be any 'protective umbrella' for the new entrants . . .

Next to the issue of whether new carriers should arise at all, it seems to EDP/IR that one of the most important elements of the decision is how AT&T will be allowed to price its specialized services in competition with new carriers. On that specific question, it looks as if the Bell System won one and tied one. The giant carrier argued that if the FCC was going to insist on authorizing new entry,

> there should be no cross-subsidization or temporary price cuts. However, AT&T should be permitted to depart from its nationwide rate structure where that practice inhibits its ability to compete effectively.

The FCC agreed. But on the question of cost-allocation for purposes of rate-making, the Commission hedged.

AT&T wanted long-run incremental costs to be the criterion; the prospective carriers wanted fully allocated costs. The FCC pointed out that a docket on rate-making principles was pending, and that it would be "premature" to express an opinion now on pricing and costing of monopoly and competitive services." But it said,

> It is our intention to permit the existing carriers to price their competitive services in a fashion that will realistically and reasonably reflect economic advantages, if any, that are inherent in the plant and operations of those carriers.

The other four questions

As to the next two issues, the FCC declined to hear claims by various applicants that (B) only they should be allowed to put up a system in a certain area. The third issue (C) was resolved with specific rulings of frequencies etc.

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The FCC's fourth query (D) is whether potential customers for the new carriers should get some measure of protection in the area of quality and reliability of service. In an earlier notice, quoted in the decision, the FCC proposed that some safeguards be required for all carriers offering private-line or other specialized services. The carrier, for example, would have to make refunds if service failed to meet promised reliability standards. A decision on this was deferred.

Likewise, the question of local facilities for the new carriers (E) won't get an answer right away. New carriers may construct their own, but there is a question as to what types or which microwave frequencies may be used. In any event, the Commission reaffirmed its view that "established carriers . . . should, upon request, permit interconnection or leased channel arrangements on reasonable terms to be negotiated with the new carriers . . . and also afford their customers the option of obtaining local distribution service under reasonable terms . . ."

A passing comment in the decision -- Footnote 41 -- seems to reflect the tone of what the Commission is saying.

> We cannot help but note several curious coincidences. There was once upon a time, almost a century ago, when Western Union was the dominant domestic carrier, and Bell was assaying new entry. It has been asserted that Western Union initially sought to make things difficult for Bell by every means at its disposal. . . .

+ + + + + + + + + + +

IBM PLAYS WITH ITS COMPUTER PRICING AGAIN

Observers began asking if maybe IBM had a computer programmed to restructure its pricing schedules every couple of months. Just as this issue was going to press, IBM announced pricing increases for the majority of its CPUs. Generally, they break down as follows:

- System/3, Model 10 -- Rental and purchase prices for most units in all 12 sub-models are increased 6%.

- System/360, Models 30 - 75 -- Rental for 6 CPUs (the 360/44 is not included) is increased roughly 4%, and maintenance on the same CPUs, if purchased, is increased 20%. Purchase prices are not affected, and the net effect is to increase system rentals by 2%.

- System/370, all models -- Rental and purchases are increased: between 5% and 8% on the 135 and 145, a flat 8% on the larger two. No maintenance increases were announced, and figures supplied by IBM indicate that typical systems will cost 4% to 4.5% more.

The announcement applies to the U.S. only. Purchase increases are effective immediately; rental and maintenance changes go into effect Nov. 1.

Coming as it does very quickly on the heels of purchase price reductions and the option of lower-priced fixed-term leases for major peripherals (EDP/IR June 2, 1971), the move has industry observers and participants -- as well as users -- asking many questions. EDP/IR currently is completing the analysis of a user survey on fixed-term leases, and will present the results of this -- plus an analysis of these latest pricing changes -- in the next issue.

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EIDP industry report

• THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" AUGUST 18,1971 • VOL.6,NO.20 P.J.McGOVERN, EDITOR

But growth continues

ADAPSO'S FIFTH ANNUAL SURVEY REVEALS DATA SERVICE INDUSTRY CONCERN ABOUT "COMPETITION" AND "IMAGE" AS CONTESTANTS COUNT THEIR LOSSES

Question: *What long-range or short-range problems do you consider most significant to the data processing service industry?*

Answer: *Making a reasonable profit!*

Therein lies the moral of Adapso's report on the computer services industry, released just this week. Behind that plea lies the stiff competition that brought widespread losses to service firms in 1970, despite a 28% increase in revenues.

- Banks are not only frequently mentioned as competitors, but they are also billed as villains by several respondents. (At the time of the survey, Adapso was conducting a suit -- since dropped -- to get banks out of the data processing business.) They are accused of "unfair competition" and "poor quality" service.

- Mainframe makers are named as competitors just as often as the banks, due to both their software capabilities and their small computers. Universities, insurance companies, and government agencies are seen as the next-worst outside challengers to computer service firms.

- But the stiffest competition comes from inside the industry. Suppliers are quick to knock each other for hurting the "image" of the independents through shoddy work and fly-by-night operations. One even said Adapso should start a "Better Business Bureau" where a customer can go for ratings of data centers.

Each year Adapso (Association of Data Processing Service Organizations) polls computer software and service suppliers to see what they've been up to. This year, International Data Corporation (publisher of EDP/IR) conducted the survey for Adapso and prepared a report based on 250 survey responses and on published earnings reports of other companies in the field.

It's important to remember that responses came from only fraction of commercial DP organizations, and on certain questions the number of replies is much less than 250. Faith in the results should be seasoned accordingly. The following pages extract some highlights of the Adapso report.

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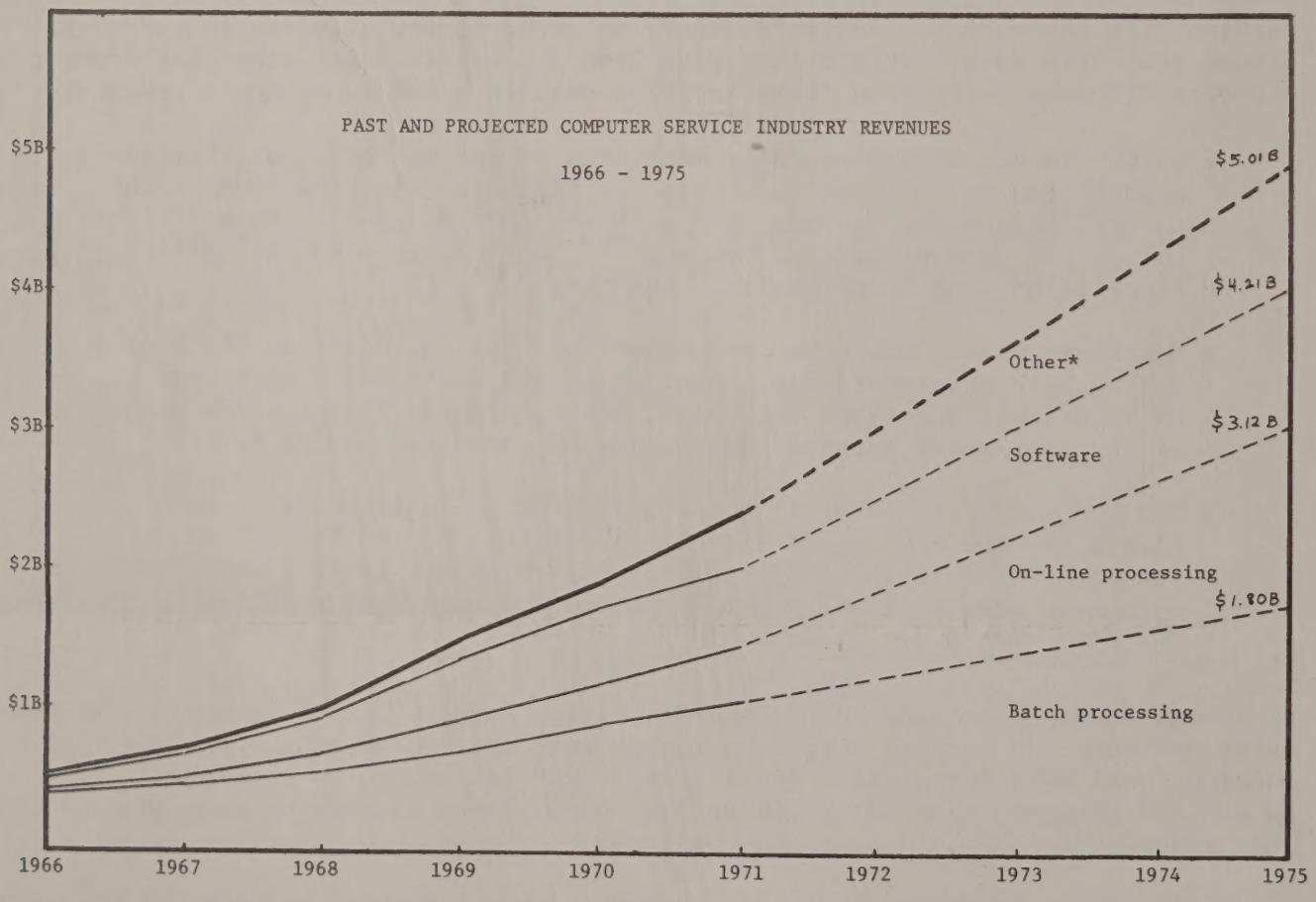
Growth of the software and service sectors

The Adapso survey covers two categories of companies: (1) independents whose main business is providing such services as data processing (batch or on-line), programming, input (keypunching, OCR) and output (COM), or selling such products as computer time and programs; and (2) organizations, owned by computer manufacturers and other companies, whose main purpose is to sell software and services to unaffiliated customers.

Thus, the study would include Service Bureau Corp., GE's time-sharing arm, CDC's Cybernet, and Boeing Computer Services. But it leaves out banks, universities, utilities, government agencies, and large users who just dabble in this area.

From the graph below, the reader can see how on-line data processing and "other " services -- such as input and output, training, and facilities management -- are gaining on the traditional batch processing and software sectors. Total revenues to software and service suppliers are estimated at almost $2 billion for 1970, a strong increase from 1969's $1.55 billion. For 1975, the projection is $5 billion. (As was explained earlier, the total excludes certain organizations whose involvement in this market is secondary to their main business.)



* Including key-punch, COM training, facilities management

The rise in number of suppliers doesn't come close to matching the rise in revenues, which means the average size of firm is getting steadily bigger. Today there are about a thousand software and service vendors in the categories covered by the survey. In 1975, while revenues zoom by $3 billion, the number of firms is expected to edge up to only 1300.

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Industry profile -- leaders' losses

Competition and image aren't the only problems facing service firms. They also complain about lack of financing, telephone company services, and pricing patterns in the market. And (surprisingly) they are still bugged by personnel problems. It all adds up to an unflattering profit profile of the "average" vendor.

At first glance, it doesn't take much to be "average" if you're a software or services vendor. You just have to find 232 customers and 81 employees willing to help you make a pre-tax loss of 8.3% on revenues.

It's important to remember, however, that "average" is not "typical." As with most industries, the software and services market is dominated by a relatively few large suppliers. The 31 organizations with revenues of $10 million or more represent 57% of the revenues, yet only 3% of the number of firms, according to the Adapso report. The majority of enterprises have revenues of less than $600K.

Thus, the gloomy profit picture depicted in Table 1, below, has actually been heavily influenced by several relatively large suppliers with very large losses.

TABLE 1: INDUSTRY PROFILE

	Total	Average per firm
1970 Revenues	$1.98B	$1.886M
1970 Pre-Tax Profit	-8.3%	-8.3%
Firms	1,050	--
Offices	3,326	3.17
Employees	85,400	81
Customers	243,350	232
Computers	3,300	3.14

Of the 84 firms that reported profits and losses in their survey replies, 58% showed a profit before taxes, 40% showed a net loss, and 2% just balanced expenses and revenues. By comparision, in the previous year 70% showed a profit.

The average before-tax profit of these respondees declined from 6.5% in 1968 to 2.9% in 1969 to a loss of 8.3% for 1970. But small and medium suppliers showed small profits -- it was the large companies with sales in excess of $750,000 that pulled the average down. These large-scale organizations also tend to offer several products and services rather than concentrating on the batch data processing that accounts for most of the revenues of the smaller firms.

The patterns of ownership of software/services suppliers indicate that a large number (58% in 1970) are private corporations. Public corporations accounted for 19% of respondents, and 10% were divisions of other companies. A few were affiliates of other companies, or fell into the proprietorship/partnership class.

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Operating ratios, or where the money goes

Table 2 below shows that the distribution of costs for survey respondents has stayed relatively stable, as compared with the 1969 Adapso survey. (Only 68 companies replied to this section of the questionnaire.) An exception is spending on equipment rental, depreciation, and maintenance.

In 1969, equipment accounted for 21.7% of costs, but in 1970, the ratio was up to 30.2%. The study suggests two likely reasons for the increase. One is unbundling; the other is that service organizations are using more expensive equipment -- terminals, OCR systems, and COM devices. The software/services industry as a whole is estimated to use about 3300 computers. IBM supplies a third, by number; Honeywell, 8%; and DEC, 10%.

TABLE 2: COMPARISON WITH PREVIOUS OPERATING RATIOS

Expenses	1969	1970
Personnel	50.2%	48.6%
Payroll Tax and Fringe Benefits	3.6	3.4
Equipment	21.7	30.2
Outside Services	3.0	2.1
Supplies	5.0	5.4
Overhead	6.8	9.8
Advertising-Promotion	NA	1.2
Other	6.8	7.7
Total	97.1	108.4
Operating Profit	+2.9	-8.3

People are the biggest cost for the 68 respondents. Personnel costs are roughly half of total expenses. There has been little change in the distribution of employees by function over the past several years. About 27% of employees are in the executive/managerial/sales category, and another 11% in clerical work. Programmers and systems analysts accounted for 21% of employees, and operators and keypunchers for 36%. Delivery/janitorial and "other" make up the remaining 5%. Averages of salaries reported by respondees are given below:

Executive	$21,400	CPU, tab operators	$7,600
Managerial/supervisory	14,500	Keypunch, etc., oper.	5,600
Sales/sales support	15,300	Clerical	6,000
Programmers	11,400	Delivery/janatorial	8,600
Systems analysts	14,400		

As was mentioned earlier, several enterprises brought up personnel problems in their survey replies. They had trouble attracting and keeping good people; colleges weren't providing quality people; personnel had no loyalty.

Where the money comes from

IDC's analysis of the survey returns uncovered several facts about software/service customers.

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- The manufacturing sector accounts for 43% of customers (by number) of service organizations. The second biggest source of customers is Wholesale/Retail, with 29% by number. However, the relative significance of these sectors is dropping as customers are added from other areas -- Banking, Insurance, and Education.

- The average number of customers per supplier is estimated at 232 for 1970. But nearly half had less than 50 customers. The distribution of clients reflects the concentration in this industry: nearly three-fifths patronize the top 7% of market participants.

- For the average service bureau, a large portion of customers are less than 10 miles away. But they tend to gain more distant business, which reflects "the ever broadening horizons of the typical organization . . ."

Services rendered

Computer service organizations are hitting the diversification trail, at least within the confines of the software/services area. Medium- and large-scale companies are becoming more actively involved in areas such as facilities management, sales of CPU time, input or output services, software development, and education. According to the Adapso study, facilities management and training in particular will about double their number of suppliers, although the study doesn't indicate just how vigorous the new competition will be.

Even now, diversity is a characteristic of the service industry. Over half the respondents obtain revenues from Accounts Receivable, Billing, and Payroll processing, and nearly half do Accounts Payable processing. But few of these companies concentrate solely on just one application or even on data processing itself.

About a third of the suppliers earn money from custom software packages, and almost a third, from standard packages. Key-input services also have a large number of offerers -- almost half the firms do keypunch work -- while only a few percent can chalk up sales from the more exotic data preparation and output services of OCR and COM. In the "other services" category, a fair number of firms sell in-house computer time (21%) and do installation management (11%), and a smaller number earn revenues from equipment leasing and training (7% each).

Conclusion

The aim of Adapso's report is to tell it like it was in the software/services field . . . a story of growth, competition, diversification, and red ink.

Bankruptcies and losses made 1970 look like a pretty bad year for this industry, but Adapso spokesman Jerry Dreyer points out two optimistic features. First, the growth of revenues continued strong last year. Second, the average small- and medium-sized company was profitable. The real losers were big corporations that couldn't put the brakes on fast enough. Adapso expects 1971 to be the turnaround year for computer services. And another organization -- Time-Sharing Enterprises -- has the same cheerful expectations for the remote computing industry. Its latest time-sharing survey is described on the next page.

(Adapso's computer services report will be distributed by that organization to its members. Copies are also available at $95 each from International Data Corp., 60 Austin St., Newtonville, Mass. 02160. IDC prepared the study.)

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TIME-SHARING SURVEY QUOTES 28 WINNERS

The flip side of an industry shakeout is survival of the fittest.

Time-Sharing Enterprises, Inc., which puts out a directory of time-sharing companies, tracked down 28 of these time-sharing "fittest" to ask how they did it. Their remarks are reported in the July 1 issue of Time-Sharing Today.

Naturally, the companies gave a lot of reasons for their relative success. Many had cut overhead by installing cheaper, non-IBM peripherals or better operating systems. Or they beefed up offerings with additional hardware and new applications packages. Better marketing and support helped too.

There is an ironic twist to some firms' comments, since the survivors recognize that their road to success is paved with the bodies of their erstwhile competitors. Although almost everybody blames the economy for slowing growth, these victors of the competitive struggle hardly mention competition per se as a problem. Little wonder . . . they have picked up a lot of customers from moribund firms. (By contrast, Adapso survey respondents complain about tough competition.)

Even tight budgets can be a blessing. They force corporations to consider outside services as a way to cut costs . . . "you can't lay off half a computer."

At the same time, these remote computing executives are aware that failures of their competitors cause "image" problems. And they echo other complaints of Adapso respondents. There are phone company gripes. Terminals aren't good enough. There is "nonsense pricing" in the industry. Good salesmen are in short supply.

The report authors suggest that other stumbling blocks -- tight investment capital, delays in getting operating systems from computer manufacturers, and a variety of data communications difficulties -- are left unmentioned.

As for the future, many of these company presidents believe the industry is moving toward more remote batch -- rather than just conversaticnal -- services and toward business rather than scientific/engineering applications.

Time-Sharing Enterprises asks the million-dollar question: What type of company is profitable? It concludes that remote computing money-makers are diverse in size and type of service (whereas the Adapso study indicates that small software/service firms tend to outperform the large). But it finds common factors:

- The profitable companies are serious about remote computing -- it's not just a "quick speculation" or "casual diversification."

- They place great emphasis on customer services . . . and all are well-known and respected in their various markets.

- Almost all do a lot of repetitive or production-like work.

- They have been in business at least two years, or are using systems that old.

Despite 1970's debacle, authors of this report see remote computing as a healthy field. They predict that, when all the returns are in, this industry will show an outstanding performance for 1971.

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A look at a look

THE 'QUARTER CENTURY VIEW' AT ACM PROVIDED FEW ANSWERS; IMMEDIATE AND NEAR-TERM QUESTIONS WERE OVERLOOKED IN WAY-OUT GENERALIZATION

Computer industry professionals attempted to reflect . . . to have a dialog . . . to project. The podium was ACM '71, the annual get-together of the Association for Computing Machinery, the computer industry's oldest society. Chicago was the location. And the theme was "A quarter-century view," commemorating the silver anniversary of Eniac's becoming operational.

Unfortunately, the attempt seemed to be an exercise in vacuousity. Perhaps there was no chance for success, just as there would have been very little if a similar group of intellectuals had been gathered in 1946 and asked to describe the chances -- and structure -- of an industry being built around a machine that was initiated to figure out ballistic tables for the Army.

The major meeting of the conference was divided into two, three-hour sessions: The look back; the look ahead. The mood of the first session was summarized about as well as possible by Anthony C. Oettinger -- session moderator, Harvard professor, and past ACM chairman. As he opened the brief discussion portion toward the end of the first session, he openly questioned the "hair shirt being thrust upon the industry." This was succinctly put, because during the afternoon most of the speakers had looked at hardware, software, technology, applications, people problems, and lessons for management . . . and essentially bemoaned the lack of accomplishment that had been made.

So the next morning -- after a Univac-sponsored black-tie dinner and reception at which some people informally made constructive comments, or at least asked realistic questions -- the panelists talked generally about the great things to come, but somehow couldn't be bothered with the immediate economic problems and near-term changes in the structure of the industry. They were scheduled to discuss the structure of the EDP market -- past and future -- but never really focused on this fundamental area.

EDP Industry Report is not prepared to measure the size of the computer industry as it approaches the 21st Century, but will summarize below our "long-range" forecasts of the various segments of the industry up through the mid-1970s:

	1970 $M Revenue	1975 $M Revenue	Annual Growth Rate
General-Purpose Computers	$ 7,625	$17,020	17%
Dedicated-Application Computers*	525	1,190	18
Independent Peripherals*	570	1,440	21
Leasing	605	900	8
Software	535	1,085	14
Service Bureaus/Time Sharing	1,235	2,960	19
EDP Education	170	365	15
Supplies	1,170	2,010	12
TOTAL	$12,435	$26,970	16%

*Shipments

Will this actually be the case? And what about things as we approach 1980 and beyond? Quite a few major questions must be considered. Here are some of the general questions that were scarcely even suggested at the ACM panel:

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? What will be the nature of the computer industry? Many "pioneers" at the meeting -- including J. Presper Eckert, co-inventor of Eniac -- speculated that only three or four mainframe companies will survive over the long haul. None would venture to choose the survivors, however, and we can't help but recall similar comments back in the mid-1960s. It is an interesting speculation today, however, in light of the rumors that have been circulating with great frequency.

? Will the mainframe manufacturers -- those that survive -- retain their dominance of computer industry revenues? One of the few ideas in which the panel concurred (and with which we agree) is that distributed computing will be a dominant force. So, what will be the role of the mainframers -- that of equipment suppliers, or total service suppliers? Would antitrust considerations prevent IBM from developing this ability, even if it wanted to?

? In the move toward distributed computing, will the computer-using community be forced through another "reset to zero?" Or can the major hardware and software suppliers effect change while preserving traditional usage?

? What about growth rates? From the fantastic surges of the mid-1960s, most segments of the industry seem to be settling down to the 15% level. Granted, this is far greater than that of any other mature industry, but much of it comes from abroad. How long can the international marketplace continue to provide adequate growth for the computer industry (especially in light of the recently changed economic policies in the United States)?

? And what about job opportunities? Will the job of programmer follow the path of the railroad fireman, as more than one panelist suggested? We can't help but think of how, when dial telephones were being installed in large numbers, the Telephone company said that without this progress it would soon need every woman in the country as a telephone operator . . . so today, virtually every person in the country is one.

Perhaps questions such as these can't be addressed during a meeting of several hundred people. But at least they could be posed. When a major industry almost officially pauses to examine where it has been and where it is going -- as well it should -- it seems to EDP/IR that even if all the answers can't be provided, at least the proper questions can be asked.

We certainly hope it won't be another five years -- much less 25 -- before the industry decides again to take a look at itself. And the next time around, we can only ask that it be done with a little more clarity.

In the meantime, we feel it only proper to start asking the questions. As we do this, EDP/IR does not suggest that the computer industry is losing its vitality. On the contrary, we continue to believe that the application of information processing to the problems of society is in its infancy, and that much growth lies ahead

As this growth develops, we anticipate changes . . . in industry structure, in equipment use, and definitely in technology. In reporting these changes, we will continue to examine the structure of the industry. We will continue to ask questions, and try to answer them in light of industry developments.

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EDP industry report

• THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" AUGUST 31,1971 • VOL.6,NO.21 P.J.McGOVERN,EDITOR

Users favor fixed-term leases

NEW NATIONAL POLICIES COULD HAVE INDIRECT EFFECTS ON COMPUTER INDUSTRY, BUT IBM'S JUNE 1 PRICE CUT REMAINS THE IMPORTANT ECONOMIC FACTOR

With one major exception that could bring an important change in mood, Pres. Nixon's wage/price freeze and other economic policy announcements did little for the computer industry except turn back the clock to June . . . making IBM's fixed-term leasing policy and associated price cuts (EDP/IR June 2, 1971) the major direct economic force in the computer industry.

The exception: The new economic policies -- announced or suggested -- should be good for the economy in general. And if business picks up, computer industry activity is almost certain to follow as a result.

The mood: With a general pickup in business, there may be a revival -- above and beyond the direct need for more processing power -- of the computer user's basic urge to "do his thing." There may be subconscious pressure to replace "old" equipment and catch up for the last year or two of bare-bones operation.

The combination of these two forces, if they both develop, could bring about a late-1971/1972 surge in domestic shipments. This could echo, if not match in relative degree, the spurt of activity that followed the new system announcements of the mid-1960s. The industry will never see the 50% growth rates of that period, but it could well snap out of the doldrums of the last few years and display the more reasonable growth most observers still expect.

These are big ifs, and can't be measured for at least six months.

For the present, the most important force at work in the domestic computer industry is the effect of IBM's fixed-term leases for peripherals. Shortly after IBM announced its new pricing policies, EDP Industry Report surveyed a representative group of System/360 users to find out their reaction. More than two hundred returns are in, and it looks as if IBM accomplished its apparent purpose:

- It checked the inroads that independent peripheral equipment manufacturers were making into its rental base;
- It placed one more "lock" on IBM's always loyal customer base.

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For one thing, the IBM users surveyed liked the idea of saving money, even though many of them said that the restrictions on the fixed-term lease (rather stiff termination charges) were too severe. EDP/IR's sample was representative of 360/30 users and above. On average, this group reported they would save about 4.75% on their monthly hardware bill by converting to fixed-term leases. For the group, this averages out to over $1200 a month for each site.

What about the rest of the industry?

In general, the users in the sample reacted very much as had been expected. Here's a brief rundown on how we read the user responses:

Independent peripheral manufacturers, the group at which IBM's move was directed, weren't given the kiss of death . . . but were put on guard. Users who have independent equipment installed, or firm orders for it, will not change plans. As many users expected, they have received additional price cuts from independents (see page 4). On the other hand, users who are upgrading say they are going to IBM 3330s or IBM 3420s, not these types of devices. And most of them report they are signing two-year leases for this equipment.

So the message is clear. In the past, users have accepted independents on a "put your box beside IBM's and if it runs as well I'll take it" basis. Now, their attitude seems to be "when my two-year lease expires, set your box beside IBM's . . ." Convincing users to move directly to an independent equivalent will be a tough sell, but unless this is done, it will be a long two years.

Third-party leasing companies will probably fare best of any industry group. Reflecting much of the philosophy outlined above, a reasonable portion of the users want IBM equipment, but will be going to their leasing company for a better price. IBM's move, to them, was an endorsement of the leasing concept. The biggest problem facing the third-party leassors will be to keep their older equipment on lease as customers upgrade. The success of this will vary, depending on individual portfolios. In general, this doesn't look like too big a problem.

Other mainframe manufacturers are still caught in the middle. Only 3% of EDP/IR's sample reported they were planning a shift in mainframes. And so long as the wage/price freeze is in effect, mainframers probably can't implement the price hikes they had announced. This point, however, is still not settled, and even IBM has not decided its position. Its latest comment is "pending receipt of [further] guidelines, we are taking orders for future delivery based on the prices announced July 28,1971." (EDP/IR July 30,1971)

New systems mean activity

One of the most important factors affecting the outlook for all of the above groups is the churning of new equipment over the next year or two. Some observers suggest that the investment tax credit -- assuming it is enacted -- will be a boon for the computer industry. EDP/IR's analysis, and our discussions with large users since the President's announcement, indicates that any direct effect will be negligible. The survey was conducted before the latest economic announcement, but its results give some indication of what users have been planning. At the top of page 3 is a breakdown of system movement expectations at 216 sites in EDP/IR's sample. Within the group labeled "no system change," a few sites are increasing core, quite a few are upgrading peripherals, and at least one plans to throw out its CPU and replace it with a terminal.

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ANTICIPATED SYSTEM MOVEMENT AT 216 IBM/360 SITES, 1971-1973

No System Change		47.2%
Seriously Evaluating System Change Within 1 Year		2.3
Changing Systems		50.5
Moving to Competitor	2.8%	
Upgrading with IBM.	47.7	
TOTAL.		100.0%

Naturally, the sites that are changing systems represent more systems than sites. Even at multi-system sites, most changes involve one-for-one upgrades, but in a few cases a single CPU is replacing two smaller 360s; a 165 for two 50s, etc. One site reported the reverse -- replacing one 360/65 with two 370/155s -- and three sites reported two movements: first move up within the 360 line, then a shift to a 370 in about 18 months. Here is a breakdown of the anticipated system movement, broken out by time frame:

ANTICIPATED SYSTEM SHIFTS AMONG IBM/360 USERS, 1971-1973

System Being Installed	Mid-1971/Mid-1972	Mid-1972/1973	Total
Any System/360	12%	4%	16%
370/135	7	30	37
370/145	13	10	23
370/155	13	4	17
370/165	4	3	7
TOTALS	49%	51%	100%

As a general rule -- as illustrated in the above two tables -- at any given point in time no more than half the computer users are considering a system shift, and no more than one-fourth on average will actually upgrade their systems during any year. This tends to hold true regardless of the point in a generation cycle, but the dollar weightings, of course, will vary.

Trends in peripherals

To determine the effect of IBM's fixed-term lease plan on independent peripheral manufacturers, the third-party leasing companies, and the other mainframe manufacturers, we have analyzed (on a site basis) the users in our sample who on June 1 rented their peripherals from IBM. Their current plans are shown below, but use caution (see page 4) in examining these figures:

PLANS OF IBM/360 USERS RENTING PERIPHERALS ON 6/1/71

	Tape Drives	Disk Drives	Printers
Will replace with Indp. or 3rd Party	5%	12%	3%
Will upgrade to better IBM peripheral	39	30	11
Will (has) convert to 12-month lease	16	18	25
Will (has) convert to 24-month lease	16	21	37
To fixed-term lease of unknown length	3	7	5
Will (has) purchase at discount	1	3	2
Will stay on 30-day notice (rent)	20	9	17
	100%	100%	100%

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As mentioned on the previous page, a few words of caution are in order in looking at the peripheral plans. First, the category "Will stay on 30-day notice" is not necessarily a good sign for the independent peripheral manufacturers. This group includes users who (at the time of the sample) weren't sure what they were going to do about system replacement but who were fairly sure that they would do something within a year. Also, it includes users whose educational or government discounts were already almost as great as those offered under the fixed-term lease plan announced by IBM (8% off monthly rental for a 12-month lease, 16% off for two years). Finally, it contains users who are planning to eliminate that type of peripheral within a year (e.g., moving from a tape system to a disk system).

Second, and in itself a very interesting finding of this survey, is the fact that users don't use the same method of acquisition (i.e., rent, 3rd party lease) for all the peripherals at their site. At the IBM/360 sites in the survey, 75%, as expected, rent some peripheral from IBM. But, 28% of the sites (not necessarily the same ones) had a piece of independent peripheral equipment and a peripheral leased from a third party:

	% with Tape Drives	% with Disk Drives	% with Printers
Sites with Ind. Per.	35%	89%	3%
Sites with 3rd Party	44%	78%	73%

Plans for replacement of the peripherals represented at these sites varied from no user planning to replace an independent printer to 27% of the users planning to replace a disk drive currently on third-party lease. Of those planning replacements, however, it is very interesting that between 60% and 80% are returning to IBM equipment:

38% of independent tape drives being replaced will stay with independents
25% of independent disk drives being replaced will stay with independents
19% of third-party disk drives being replaced will go to independents
none of third-party tape drives being replaced will go to independents

This trend illustrates the point made earlier; the user looks to IBM when he is considering a move to a more sophisticated product.

Third, users moving to peripherals based on new technology, or at least offering better performance, are looking to IBM. They are making major commitments that will lock them in even tighter than ever. The table below gives a breakdown of the orders users reported in the sample. (2314/19s are included because many of these disk drives are replacing older 2311s.)

IBM PERIPHERAL EQUIPMENT ON ORDER

	3330 (Disk)	2314/19 (Disk)	3420 (Tape)
Purchase*	14%	16%	10%
12-month lease	6	0	16
24-month lease	54	63	46
Unknown lease	26	21	28
	100%	100%	100%

*Includes equipment going on third-party lease

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REACTIONS FROM INDEPENDENT PERIPHERAL EQUIPMENT MANUFACTURERS

After IBM's price cut announcement, independent peripheral equipment manufacturers reported a three-to-four week hiatus while users mulled over IBM's action. And most manufacturers reacted slowly and moderately. Now, there is talk that order rates are rising again, but it didn't show up in the EDP/IR survey. Still, the independents are stressing the positive, stating that IBM, by recognizing the importance of the independents, will force users to examine them even more closely. Here's a rundown on what's happening:

Ampex generally lowered disk-drive prices 1% to 5% (with sharpest cuts for the most popular configurations) and raised prices on tape drives 2% to 6%. There are no termination charges for upgrade. In general, Ampex decided to concentrate on the requirements of individual customers, designing packages and terms to fit particular needs, rather than change prices across-the-board. As part of this approach, it is pushing complete peripheral replacement -- disk, tape, and core.

Calcomp has continued its policy of pricing slightly below IBM with equipment that offers better performance characteristics. (Its 2319-type disk drive, which leases for 3% to 10% less than IBM's, has faster access times.) It offers upgrades with no termination option, 70% purchase credit (as opposed to IBM's 50%), leases of one to four years, and discounts on quantity purchases. Century Data, as well as supplying the drives Calcomp sells to end users, has been OEMing a double-density disk drive to Burroughs since last spring.

Marshall's role as an independent peripheral manufacturer may change now that it has cast its future with DPF&G through a new company that will be 70% owned by the large leasing company. (At yearend 1970, DPF's $240-million portfolio of 360s made it the single largest third-party leasing company, but not by much, with just over 10% of U.S. 360s on third-party lease.) Shortly after IBM announced the fixed-term lease, Marshall responded in similar fashion, adding a two-year lease, cutting rental prices by 6-1/2%, purchase prices 5%, one- and two-year leases by about 6% and 12% respectively. It has no termination charge for upgrades and, like Calcomp, Marshall has a double density 2319 replacement and pushes technical advantage as well as price superiority. Marshall is one of the leading independent suppliers of 2311-type drives, but has this position because it continued building until quite late in the product cycle. Many of the machines delivered lately could come back to haunt the manufacturer before they are paid for by users.

Memorex, following IBM, shaved some prices, but has been wary of quoting exact prices in public. In general, its disk prices are 5% to 15% under IBM's, but some prices are actually higher. And the termination clause is quite similar to IBM's; company policy says "a lease is a lease" -- so no free upgrading, just as before the IBM announcement. The company may have some disenchantment with second-sourcing IBM, and is moving into new product areas -- terminals and computer-output microfilm.

Potter designed some price increases into its new price list, particularly for 30-day cancellation rentals of tape drives. It introduced one-year and two-year leases for the first time, and all two-year leases are lower than IBM's equivalent. Lease terms include a 90-day extension option and no termination charges on upgrade or downgrade during the last year of the lease. On the legal front, Potter brought suit against IBM in New York State, claiming that the move to fixed-term leasing policy (on IBM's part) was monopolistic. IBM, of course, made its usual statement that there was no grounds, etc.

(Continued on page 8)

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GENERAL PURPOSE COMPUTER CENSUS

Counts in the General Purpose Digital Computer (Group A) Census, shown below, are based on the best information available to the International Data Corporation, but are estimates. Computer manufacturers, as a rule, do not directly supply this type of information, and it is only through the use of IDC's extensive data files and other information sources that such estimates are possible. The computers included in "Group A" comprise the bulk of digital computers in operation. They are byte or character oriented -- with the exception of large-scale scientific machines -- and are primarily programmed with higher-level languages. In addition to this Census, EDP/IR publishes a Dedicated Application Digital Computer (Group B) Census that includes minicomputers and specialized-purpose machines.

AS OF JULY 1, 1971

NAME OF MANUFACTURER	COMPUTER MODEL	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS IN U.S.	NUMBER OF INSTALLATIONS OUTSIDE U.S.	TOTAL NUMBER OF INSTALLATIONS	TOTAL NUMBER UNFILLED ORDERS
Burroughs	205	$ 4,600	1/54	1	5	6	X
	220	$ 14,000	1/58	6	2	8	X
	B-100 Series	$ 3,300	8/64	10	0	10	X
	B-200 Series	$ 6,500	11/61	240	144	384	X
	B-300 Series	$ 8,000	7/65	505	95	600	X
	B-500	$ 3,800	11/68	340	330	670	85
	B-2500	$ 6,500	2/67	205	76	281	45
	B-3500	$ 14,700	5/67	355	215	570	110
	B-4500	$ 29,000	11/71	-	-	-	40
	B-5500	$ 33,500	3/63	138	39	177	X
	B-5700	$ 27,000	12/70	10	1	11	30
	B-6500	$ 70,000	11/69	21	19	40	X
	B-6700	$ 67,000	2/71	3	2	5	22
	B-7700	$120,000	2/72	-	-	-	4
	B-8500	$200,000	4/69	1	0	1	X
	Subtotals			1835	928	2763	336
Control Data Corp.	G-20	$ 19,600	4/61	5	8	13	X
	1604/A/B	$ 42,000	1/60	27	5	32	X
	31/3150	$ 10,500	12/64	102	66	168	10
	3170	$ 16,700	12/70	4	1	5	6
	3200	$ 14,000	5/64	62	54	116	4
	3300	$ 20,500	9/65	113	110	223	10
	3400	$ 23,700	11/64	4	12	16	X
	3500	$ 25,000	1/69	4	10	14	X
	3600	$ 48,000	6/63	21	22	43	X
	3800	$ 53,000	12/65	11	5	16	X
	6200	$ 39,000	11/70	4	0	4	2
	6400	$ 55,300	5/66	57	32	89	6
	6500	$ 65,500	12/67	14	2	16	X
	6600	$127,000	8/64	60	33	93	3
	6700	$137,000	7/70	4	0	4	2
	7600	$190,000	1/69	6	1	7	4
	Cyber-72	$ 25,000	3/72	-	-	-	NA
	Cyber-73	$ 50,000	3/72	-	-	-	NA
	Cyber-74	$100,000	3/72	-	-	-	NA
	Cyber-76	$200,000	3/72	-	-	-	NA
	Subtotals			498	361	859	47
Digital Equipment Corp.	PDP-6	$ 10,000	10/64	17	6	23	X
	PDP-10	$ 13,500	10/67	123	52	175	4
Friden	System-10	$ 1,400	10/70	40	24	64	120
Honeywell	G-5X Series	$ 1,400	1/66	75	1360	1435	100
	G-105	$ 1,350	3/69	22	33	55	20
	G-115	$ 2,500	4/66	235	1060	1295	X
	G-120	$ 3,200	1/70	26	75	101	30
	G-130	$ 4,400	10/69	2	43	45	5
	G-205	$ 2,900	6/64	4	0	4	X
	G-210	$ 16,000	3/60	19	0	19	X
	G-215	$ 6,000	9/63	6	0	6	X
	G-225/255	$ 8,500	4/61-10/67	142	22	164	X
	G-235/265	$ 14,500	4/64-10/65	67	23	90	X
	G-245/275	$ 18,000	10/69	3	2	5	2
	G-405/410	$ 7,200	2/68-11/69	24	3	27	2
	G-415/420	$ 7,600	5/64- 6/67	185	230	415	9
	G-425/430	$ 13,200	6/64- 6/69	68	82	150	6
	G-435/440	$ 14,800	9/65- 7/69	39	19	58	2
	G-615	$ 55,000	6/69	14	10	24	6
	G-625	$ 65,000	4/65	1	4	5	X
	G-635	$ 80,000	5/65	61	21	82	X
	G-645	$120,000	7/66	4	0	4	X
	G-6030/6040	$ 25,000	7/71- 3/72	-	-	-	10
	G-6050/6060	$ 46,500	7/71- 3/72	-	-	-	11
	G-6070/6080	$ 61,500	7/71- 3/72	-	-	-	5
	G-Subtotal			997	2987	3984	208
	H-105	$ 2,100	11/71	-	-	-	NA
	H-110	$ 3,200	9/68	153	109	262	35
	H-115	$ 4,000	3/70	340	125	465	180
	H-115/2	$ 5,060	1/71	60	24	84	110
	H-120	$ 5,000	1/66	590	310	900	X
	H-125	$ 7,400	12/67	145	345	490	40
	H-200	$ 7,600	3/64	595	310	905	X
	H-1015	$ 8,400	4/71	20	4	24	NA
	H-12/1250	$ 10,500	2/66- 8/68	350	150	500	X
	H-2015	$ 12,800	2/71	40	7	47	NA
	H-2200	$ 19,600	1/66	120	60	180	5
	H-3200	$ 23,000	2/70	51	22	73	30
	H-4200	$ 28,500	9/68	27	6	33	6
	H-8200	$ 50,000	2/69	17	4	21	4
	H-400	$ 10,600	12/61	40	30	70	X
	H-1400	$ 14,000	1/64	4	6	10	X
	H-800	$ 26,000	12/60	50	14	64	X
	H-1800	$ 46,000	7/64	14	3	17	X
	H-Subtotals			2616	1529	4145	410
	Subtotals			3613	4516	8129	618

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AS OF JULY 1, 1971

NAME OF MANUFACTURER	COMPUTER MODEL	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS IN U.S.	NUMBER OF INSTALLATIONS OUTSIDE U.S.	TOTAL NUMBER OF INSTALLATIONS	TOTAL NUMBER UNFILLED ORDERS
IBM	System-3	$ 1,400	1/70	3,500	600	4,100	5,000
	360/20	$ 4,200	12/65	8,600	6,100	14,700	1,080
	360/22	$ 5,600	7/71	-	-	-	NA
	360/25	$ 8,000	10/68	2,170	1,080	3,250	300
	360/30	$ 12,300	6/65	6,600	3,350	9,950	90
	370/135	$ 16,200	5/72	-	-	-	1,100
	360/40	$ 22,000	5/65	3,200	2,000	5,200	150
	370/145	$ 28,900	7/71	-	-	-	1,300
	360/44	$ 13,800	7/66	125	105	230	X
	360/50	$ 36,500	8/65	1,320	655	1,975	55
	370/155	$ 50,900	2/71	72	24	96	950
	360/65	$ 69,000	11/65	650	220	870	30
	370/165	$ 89,000	6/61	2	0	2	300
	360/67	$138,000	6/66	66	9	75	X
	360/75	$ 91,000	1/66	53	22	75	X
	360/85	$155,000	10/69	14	6	20	1
	360/9X	$150,000	11/67	13	4	17	X
	360/195	$210,000	3/71	1	0	1	8
	370/195	$215,000	5/73	-	-	-	NA
	1130	$ 2,200	2/66	3,790	1,710	5,500	60
	305	$ 3,600	12/57	1	19	20	X
	650	$ 4,800	12/54	4	30	34	X
	1401	$ 6,200	9/60	1,675	1,820	3,495	X
	1401-G	$ 2,300	5/64	200	72	272	X
	1401-H	$ 1,300	6/67	78	17	95	X
	1410	$ 17,000	11/61	155	117	272	X
	1440	$ 4,100	4/63	590	500	1,090	X
	1460	$ 9,800	10/63	110	58	168	X
	1620	$ 4,000	9/60	415	280	695	X
	7010	$ 26,000	10/63	35	11	46	X
	7030	$160,000	5/61	4	2	6	X
	704	$ 32,000	12/55	3	4	7	X
	7040	$ 25,000	6/63	22	27	49	X
	7044	$ 36,500	6/63	24	25	49	X
	705	$ 38,000	1/56	19	7	26	X
	7070/74	$ 27,000	3/60-2/61	166	52	218	X
	7080	$ 60,000	8/61	66	1	67	X
	7090	$ 63,500	8/60	27	27	54	X
	7094	$ 73,400	9/62	76	11	87	X
	7094-II	$ 79,400	4/64	18	0	18	X
	Subtotal			33,864	18,965	52,829	10,424
NCR	Century-50	$ 1,650	2/71	75	0	75	150
	Century-100	$ 2,600	9/68	1400	450	1850	150
	Century-200	$ 7,700	9/69	405	155	560	90
	Century-300	$ 20,000	2/72	-	-	-	20
	304	$ 10,000	1/60	10	2	12	X
	310	$ 1,000	5/61	8	0	8	X
	315	$ 7,000	5/62	350	375	725	X
	315-RMC	$ 9,000	9/65	125	50	175	X
	390	$ 800	5/61	290	440	730	X
	500	$ 1,000	10/65	1000	1750	2750	100
	Subtotal			3663	3222	6885	510
Philco	1000	$ 7,000	6/63	13	1	14	X
	210/211	$ 40,000	10/58	12	1	13	X
	212	$ 52,000	1/63	12	1	13	X
RCA	2	$ 14,600	7/71	-	-	-	50
	3	$ 19,600	10/71	-	-	-	26
	6	$ 29,900	10/71	-	-	-	24
	7	$ 40,100	10/71	-	-	-	20
	Spectra 70/15	$ 5,100	9/65	32	120	152	15
	Spectra 70/25	$ 7,900	9/65	11	60	71	X
	Spectra 70/35	$ 13,600	1/67	170	215	385	43
	Spectra 70/45	$ 23,100	11/65	345	180	525	50
	Spectra 70/46	$ 40,200	11/68	57	5	62	12
	Spectra 70/55	$ 41,600	11/66	20	16	36	X
	Spectra 70/60	$ 43,100	9/70	11	3	14	10
	Spectra 70/61	$ 55,000	3/71	6	0	6	8
	301 (a)	$ 9,500	2/61	245	293	538	X
	3301 (b)	$ 25,000	7/64	67	5	72	X
	501 (c)	$ 17,000	6/59	38	5	43	X
	601	$ 50,000	11/62	4	0	4	X
	Subtotal			1006	902	1908	258
Standard Computer Corp.	IC-4000	$ 9,000	9/68	16	0	16	X
	IC-6000	$ 16,000	5/67	9	0	9	X
	IC-7000	$ 17,000	6/69	19	0	19	X
Univac	I/II	$ 25,000	3/51-11/57	7	3	10	X
	III	$ 25,400	8/62	44	43	87	X
	SS-80/90	$ 8,000	8/58	68	70	138	X
	418-I/II	$ 13,700	6/63- 9/64	91	131	222	X
	418-III	$ 19,600	7/69	29	45	74	16
	491/492	$ 27,000	12/61	22	14	36	X
	494	$ 41,400	2/66	62	48	110	8
	1004	$ 1,900	2/63	1040	1380	2420	X
	1005	$ 2,550	4/66	685	185	870	X
	1050	$ 8,800	9/63	205	185	390	X
	1103/1105	$ 35,000	12/50-9/58	5	2	7	X
	1106	$ 40,000	12/69	28	29	57	23
	1107	$ 57,000	10/62	16	19	35	X
	1108	$ 68,000	9/65	142	102	244	13
	1110	$ 79,000	11/71	-	-	-	5
	9200	$ 1,700	6/67	1360	670	2030	165
	9300	$ 4,000	9/67	820	860	1680	170
	9400	$ 10,000	5/69	105	120	225	45
	LARC	$135,000	5/60	1	0	1	X
	Subtotals			4730	3906	8636	445
Xerox Data Systems	Sigma-5	$ 11,500	8/67	208	56	264	18
	Sigma-6	$ 20,000	11/70	8	1	9	9
	Sigma-7	$ 24,000	12/66	98	32	130	9
	Sigma-8	$ 19,000	9/71	-	-	-	8
	Sigma-9	$ 44,000	9/71	-	-	-	6
	940	$ 24,000	4/66	41	8	49	X
	9300	$ 8,500	11/64	25	6	31	X
	Subtotals			380	103	483	50
	TOTALS			49,850	32,988	82,838	12,812

Notes: a. inc. HIS - Bull Gamma 30 and 30S
ICT - 1500
Hitachi - 3010

b. inc. HIS - Bull Gamma 40
Hitachi - 4010

c. inc. ICL - English Electric KDP-10

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Storage Technology has adjusted prices by model, maintaining a price advantage, though smaller, over IBM. It has no termination charge for upgrade. STC's biggest hope is its replacement for IBM's 3420 tape drive. The company has already delivered its first models -- ahead of IBM with first deliveries scheduled for this October, telex set to deliver late this year, and Potter's first shipments announced for early in 1972.

Telex, introducing three new marketing plans, probably has the most innovative response to IBM's price cut. These plans boil down as follows:

- A rental accrual plan in which the user is given credit during the term of a lease for free rental at its end. For example, the user gets 33 days of free use after 12 months, and seven months on a 36-month lease. This boils down to discounts of 8% to 16%.

- A 12% discount on cash purchases.

- A 36-month installment purchase plan that provides a 6% discount and has no interest or carrying charges.

In addition, Telex has no penalties for upgrade, and users may apply all of the first 90 days of rental toward purchase. Also, as the result of recent legal action, Telex will be marketing a double-density drive manufactured by Information Storage Systems. This is the outcome of a suit brought by Itel, parent of ISS, in an attempt to prevent Telex from marketing this device. It has been settled, at least temporarily, in favor of Telex.

How does it all net out?

It is obvious that the independent peripheral manufacturers are in there trying. But unless they change their marketing approach from one of replacing existing IBM equipment to one of selling a capability in new technology -- especially with the double-density disk drive, which IBM doesn't manufacture -- they may be indulging in an internecine war over a reduced base of spoils. Most of the users apparently don't know about the independent offerings, and thus have returned to IBM as they upgrade their systems.

In any event, it looks as if users are pleased with the reduction in their rental bills that IBM's move has provided. Some of them will "pocket" the savings and be able to stretch their tightened budgets a little further. But from the survey . . . and from user interviews being conducted among major users by the International Data Corporation, publisher of EDP/IR . . . there are growing hints that this savings will rapidly be transferred into additional spending. Whether the money is returned to IBM or spread across the board is an even bigger question, but it seems clear that the other industry forces -- the third-party leasing companies, the independent peripheral manufacturers, the other mainframers -- must compete boldly.

For this reason, EDP/IR repeats its initial prognosis: "THE PRICE CUT OF 1971 signals a folding of the umbrella and a shift to real price competition in the computer industry. Perhaps this is good, perhaps not. But it clearly signals a change in the rules of the computer industry." We might only add that it comes at a time when users are more sophisticated, when IBM for the first time is truly leading the way with technology, and when there is extreme pressure for an economic upturn. Thus, the mood seems right for the user to go ahead and do his thing again.

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SEP 16 1971

EDP industry report

• THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" SEPTEMBER 15,1971 • VOL.6,NO.22 P.J.McGOVERN,EDITOR

Revaluing Japan

JAPANESE COMPUTER INDUSTRY CHALKS UP IMPRESSIVE GROWTH; UNCERTAIN LIBERALIZATION POLICIES CONTINUE TO CLOUD AMERICAN PROSPECTS

The biggest company in the world is not AT&T or General Motors, asserts a Japanese economist in Tokyo, but something he calls "Japan, Inc." . . .

Japanese companies compete fiercely for market shares, but they do cooperate with each other and the government in ways that would make U.S. antitrusters bristle. Companies accept "administrative guidance" from the powerful Ministry of International Trade and Industry (MITI) on everything from mergers and the formation of cartels to imports of technology.

This description from Business Week (Mar.7,1970) indicates what American companies are up against when they try to crack into the fastest-growing EDP market in the world -- Japan. Despite the recent shocker to U.S.-Japan trade relations -- the tariff surcharge and floated dollar -- there are still signs that Japan will liberalize import quotas on much computer peripheral equipment. Simultaneously, of course, Japanese industry will continue building its own domestic capabilities.

In this issue, EDP Industry Report takes a close look at how U.S. companies have been doing on the other side of the Pacific, and their chances for the future. Part of this analysis is based on our conversations with computer executives and government officials during a recent trip to that country. Our major findings are that, in the next few years, Japan will not be a major export market for U.S. companies nor is there much likelihood of direct Japanese competition in the States; but computer products from Japan will appear more and more in other world markets:

- For the most part, U.S. enterprises haven't made significant sales to Japanese computer users. (Even IBM, with a protected subsidiary there, only has about one-third of the computer base, by value.) And expectations for the future are not good. Even if import restrictions are relaxed nominally, the government is likely to influence business to "buy Japanese." Only in equipment areas where there isn't any domestic supply can imported American gear make much headway . . . and then only until it is duplicated.

- The Japanese computer makers' rumored attempt to "invade" the U.S. marketplace in the near future is mostly a myth, especially with the current

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trade controversy. Japan seeks to protect its current large U.S. export business in products such as autos and consumer electronics. Thus, it will focus computer marketing elsewhere.

- While laying low in the United States, Japanese computer vendors will agressively go after export markets in the Orient and in Europe. Already they are making impressive strides in areas such as Eastern Europe, Russia, the Phillippines, and Southeast Asia. Increasingly, they are vying for business in Western Europe as well.

- Japanese vendors will participate indirectly in the U.S. computer industry by providing capital to peripheral makers and to software and service firms. This approach eases American balance-of-payments difficulties, while allowing Japan to build up marketing outlets and support capabilities for possible later entry into the overall EDP system business in the U.S.

- A vigorous tug-of-war is going on between the major Japanese computer makers, Japanese trade officials, and the powerful MITI. Vendors want participation restrictions on U.S. hardware and software continued, but trade officials are trying to pacify U.S. industry by speeding liberalization of trade barriers for EDP and other protected industries. MITI is trying to referee the disputing interests.

Meanwhile, under the system of industry-government cooperation known popularly as Japan, Inc., Japanese computer makers are beefing up their competitive muscle by allocating responsibilities for small computers, communications hardware, selected software, etc., among the Big Six mainframers and related firms.

Land of the Rising Yen

Products such as computers seldom make the headlines after conferences such as that held last week between cabinet-level U.S. and Japanese officials. But as a significant product group, their status was a bargaining item, and will continue to be, as Washington and Tokyo hammer out some kind of trade understanding during the coming months. In the last issue (EDP/IR Aug.31,1971) we pointed out that the U.S. computer industry would feel little direct impact from President Nixon's new game plan. Some of the new economic policies, however, could have ramifications for the computer industry vis-a-vis Japan.

The ten-percent tariff surcharge won't directly affect Japanese suppliers of computer hardware very much, if at all, because they didn't have much hope of making significant sales in the U.S. for several years. To be sure, Fujitsu, Hitachi, Matsushita (Pansonic) and a smaller company called Teac have all done some marketing here. Fujitsu even has sold Facom computers to its New York-based distributor, Automation Sciences. But the net impact of these efforts has been imperceptible.

Even before the monetary package was announced, Japanese manufacturers likely had been urged to go slow, so as not to antagonize the U.S. in one of its strong export areas, computers.

The depreciation of the dollar ought to boost Japanese demand for U.S. computer hardware, since at this writing dollars were 7%-to-8% cheaper in terms of the yen. But there's a catch. Often, what keeps an American company from selling a piece of EDP gear in Japan is not price, but import restrictions. Only hardware

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for which it is relatively easy to get a license, such as large-scale systems, would react to a price cut.

Also, some American computers are actually manufactured in Japan, and so cost as well as price will go up in terms of dollars. However, since computers manufactured in Japan use American-made integrated circuits and other parts imported from the U.S., the cost should rise less than the price.

The floating dollar affects American companies in some other ways, however. For one, it raises the cost of investing U.S.-raised capital in a Japanese affiliate . . . $10 million buys a few feet less of plant space in Osaka than it used to. But if American companies are in the process of bringing capital back from their overseas operations, rather than re-investing abroad, their foreign money is worth more. (Even if they aren't repatriated, profits from foreign subsidiaries will look better on the income statement since they convert to more dollars.)

Indirect effects -- Lady or the Tiger?

About a month ago, the Japanese man-on-the-street was described as "shocked" by America's new trade policy, which he interpreted as strongly directed at Japanese exports. Some of the damage will be to the giant families of companies with heavy investment in export goods, as well as an interest in the computer area. The Mitsubishi group (which recently advertised: "We're Not Exactly an American Household Name -- Yet") produces computers only as a minor part of its business. The same goes for the large electronics concerns, Hitachi and Nippon Electric. Fujitsu, part of the Furukawa group, has a somewhat deeper involvement in computers.

These companies may push to maintain protection in the computer area as a reaction to probable loss of business in their other product groups. Washington is pessimistic about obtaining liberalization of full systems so long as the 10% surcharge is in effect. At last week's talks, Japan said it would "seriously consider" liberalizing substantial amounts of peripheral imports next year.

But MITI's official rules don't tell the whole story. It may technically liberalize over the conference table while persuading users at home to stick with Japanese hardware and software suppliers. The high level of cooperation between business, banks, and government makes it entirely possible that Japanese users will freeze American companies out of many market sectors on a strictly voluntary basis.

JAPAN'S COMPUTER USE GROWS AND GROWS

When it comes to EDP, Japan, Inc. talks big. A 1970 White Paper by an industry-government task force says:

> *The spread of the computer is closely related to Japan's economic growth and there exists almost unlimited possibilities for computer application in bringing about the highest degree of control and coordination in every aspect of society.*

And data from the Japanese Electronic Computer Company (which finances leases of Japanese-built computers) makes that statement sound a little less starry-eyed. It indicates a 56% increase in shipments for the fiscal year ending in March, 1971, over the previous year. Japan is behind West Germany in installed value, incidentally, despite the noise about Japan's being Number Two in computers; it ranks ahead only in terms of numbers, because many of its computers are quite small.

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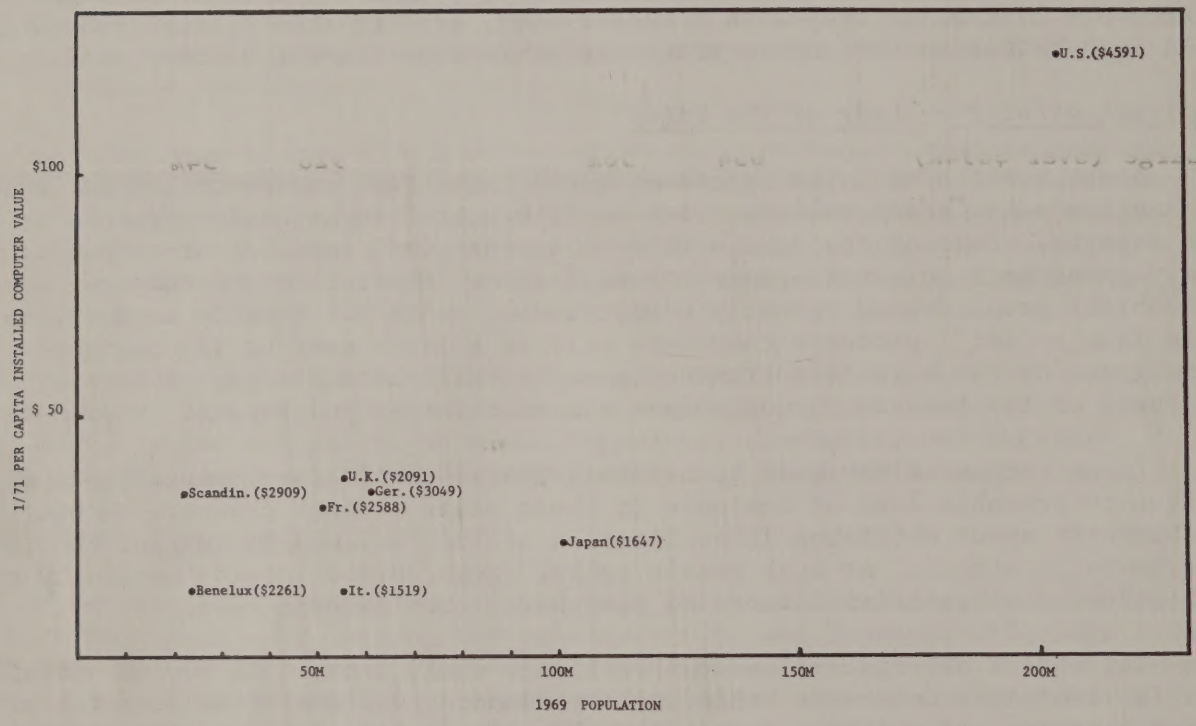
There's nothing magical about this insatiable appetite for computers. It merely reflects the country's rather fantastic economic growth, which even in its current "depression" may be running at 8% or so in real terms. Even though that little island may soon have the second biggest computer base in the world, it is still lightly computerized in terms of its 100-million-plus population. EDP/IR expects Japan's computer base to catch up with its population only as economic growth pushes up per-capita income. The chart below shows Japan's low ratio of computer value to population as compared to the U.S. and much of Europe.

COMPUTER PENETRATION BY COUNTRY
(Per-capita Income in Parentheses)



Twice each year -- for March and September -- the JECC publishes figures on the Japanese computer market. The table on page 5, based on JECC data for March of 1971 and earlier years, shows the rapid build-up of computers in Japan as well as the relatively high percentage of them that are manufactured by locally owned companies. (EDP/IR urges a note of caution with this data. Some machines defined by JECC as computers are not considered as such in the U.S.; also, some definitions are subject to change over time.)

It also goes without saying that Japanese computer users have their own unique pattern of product use, and their penchant for small computers is just one difference. The demand characteristics are determined not only by the immaturity of the market (relative to the U.S.) but also by an industrial structure peculiar to Japanese business, and by availability of such related factors as communications lines and rental financing.

Communications is a monopoly of the government-backed Nippon Telephone and Telegraph Public Corp. (NTT). And if U.S. communications users think they have gripes, they should look at their Japanese counterparts.

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JECC DATA ON GROWTH AND DISTRIBUTION OF COMPUTERS IN JAPAN

Computer Installations: March, 1966 - March, 1971

	1966	1967	1968	1969	1970	1971
Total number	1937	2606	3546	4870	6718	9482
Total value ($M)	$ 484	$ 624	$ 837	$1226	$1714	$2475
(Foreign share*)	(63%)	(55%)	(52%)	(49%)	(47%)	(45%)

Distribution by Size Class
(In Terms of Numbers Installed)

	March, 1970		March, 1971	
	Total	% Foreign*	Total	% Foreign*
Large (over $694K)	634	58%	928	54%
Medium ($111K-$694K)	2376	30%	3170	27%
Small ($28K-$111K)	2429	25%	3180	26%
Ultra Small (below $28K)	1279	5%	2204	26%
Total	6718		9482	

* "Foreign" includes computers manufactured in Japan by U.S.-based companies

Source: Japan Electronic Computer Company, Ltd.

Japanese users complain about high rates, restrictive policies, and limited offerings of their sole public communications supplier. Even ordinary telephone users have a long wait to get sets installed. And in the past, nobody could provide commercial time-sharing services except NTT.

Things are looking better. The telephone company is developing higher-speed transmission services; the ban is off commercial time sharing; and other prohibitions have been relaxed. At least two Japanese companies plan to offer time-sharing services using American computers, but it will still be awhile before Japanese users can move heavily into remote computing.

Then there are the "brain trusts" . . . electronic and human. In Japan, a large family of companies groups around a common bank and has extensive dealings among its members. A trend is underway for these groups to form "information syndicates" that share research in various fields, data banks, and/or data processing operations. For example, last May Sanwa Bank established Toyo Data Systems, with the total participation of 60 firms, to use computers jointly and share software efforts.

The impact on computer use might roughly be the same as if a giant diversified American company acquired Manufacturers Hanover and then centralized all computer operations. But the extent to which the Japanese partners can indulge in remote computing from a large-scale computer is limited by communications availability.

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This organization of much of Japanese Big Business into company families has an interesting sidelight for computer sales by U.S. companies. If the group contains a computer manufacturer, and if that manufacturer makes an appropriate system, reciprocity means the domestic manufacturer has his own group's computer business sewed up tight.

Computer renting is a different game entirely in Japan, even though the majority of computers are rented. JECC (as mentioned earlier) handles rentals for the Japanese manufacturers (while IBM Japan and other "foreigners" do their own renting). JECC ran into funding problems some time ago, and in February, 1970, quit handling computers with a "basic system" renting for less than $450. This represented 20% of JECC's total purchases, and manufacturers or other financial sources had to take up the slack . . . not too easy in a tight capital market. It suggests why the percentage of "foreign" computers in the "Ultra Small" range jumped up significantly during the last year (page 5).

THE JAPANESE PLAN

A booming market is fine for Japan, but how do U.S. computer firms get a piece of the action? The Japanese government isn't exactly eager for Americans to carve the same kind of dominant share in its computer market that they did in Europe. The only reason IBM has its 38% of the installed base is that its wholly owned subsidiary was formed before investment barriers went up after World War II.

IBM Japan manufactures processors and I/O peripherals for System/3, 360/20, 360/40, 370/135, and 370/155 in Japan. It can market those computers free of the restrictive licenses that make it tough for other U.S. mainframers to penetrate the lower-end market. Univac -- through its joint venture with Oki Electric -- and NCR are the only other U.S. mainframers manufacturing in Japan.

The Japanese manufacturers, of course, didn't enter the computer marketplace on their own. In most cases, a Japanese electronics company opted to produce U.S.-designed machines under licensing agreements until it could acquire enough experience to develop its own system. Nippon Electric, for example, has Honeywell licenses, but it has recently produced several small-to-medium computers of its own design. Hitachi offers a new line not restricted by its RCA agreement. Of the Japanese Big Six, only Fujitsu is entirely independent of U.S. technology, since this manufacturer of communications gear has always relied on its own technology.

In the minicomputer area, however, technology licensing agreements are still springing up. Last April, Data General agreed to license a minicomputer company (formed by seven Japanese partners) to manufacture its minis. At first, though, DG is shipping the finished computers. Nippon Mini-Computer (the Japanese licensee) plans to start actual production by the end of this year.

And the largest mini manufacturer, Digital Equipment, will probably be announcing a deal shortly. EDP/IR understands that Matsushita Communications will manufacture minicomputers under DEC license, but a joint venture between DEC and the Japanese company will handle the marketing. Thus, DEC gets not only revenues from royalties, but also a slice of the more significant marketing profits. (From its headquarters in the U.S., DEC still has no comment to make on this subject.)

The end result is that U.S. computer makers are giving a leg up to their future competitors through this form of technology transfer. But there's not much else they can do, since they are otherwise barred from direct market participation.

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Think small

Almost every country with a national computer manufacturer gives lip service to strengthening its own industry. What usually results is one national manufacturing company that just hangs on by grace of government business and capital infusions, but which is not really competitive with U.S. mainframers. The U.K. and Japan are the only countries where domestic producers have over half the market.

But in Japan, government support is more simply lip service. A whole array of tactics -- import licenses, investment bans, grants, loans, and legalized cartel-type arrangements -- have been used to beef up domestic industry. In July, however, MITI said the government would partially liberalize peripherals imports, starting at the end of 1971 or in the spring of 1972. Now, however, there is concern over the scope of any liberalization policy.

As originally outlined, items to be put on the automatic approval list include line printers, tape readers, card readers, and some control equipment, but not memory devices, terminals, processors, or components. The latest round of discussions has suggested that some of the latter-type products may eventually be included, but nothing is positive at the moment.

In any event, investment in computer-related manufacturing won't be opened up for at least three years, and even then it appears that only up to 50% control will be allowed in the hands of foreign investors. No date has been set for opening up investment in software or service companies.

"Think small" means think about minicomputers, communications controllers, and small business systems. These are the areas where Japanese producers will work hardest to compete with the U.S. Japan does not plan to invest significant sums in medium- and large-scale computer development. A project is underway to develop hardware and software for a super-scale machine -- 1971 had been mentioned as the completion date -- but progress has been slower than expected. This project, according to the Japanese, is more an effort to upgrade technical expertise than an effort to bring a giant system to the marketplace.

"Rationalization" of peripherals production

What would be a blatant violation of antitrust laws in the U.S. is actively encouraged by the Japanese government. The plan for the computer industry includes a cartel arrangement where the members divy up production of peripheral devices including paper tape, card equipment, and other I/O devices.

In the future, a further centralization is likely. By 1975, Japan may have three suppliers of complete systems -- CPU manufacturers that acquire their peripherals from other companies. These mainframers will probably be today's top dogs, Nippon Electric, Fujitsu, and Hitachi. The rationale for this "rationalization" is clear: The Japanese market is too small for each of a number of competing suppliers to reach economic levels of R&D and production.

Thus, in planning the Japanese computer industry of the future, the Japanese government probably will continue protecting its participants in two ways: Restrict direct investment in Japanese companies and maintain most computer hardware and software under the most restrictive import licensing system. This illustrates the peculiar kind of "free economy" in Japan, with the Ministry of International Trade and Industry (MITI) retaining tight control over foreign participation.

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There are signs that the Japanese computer industry is girding itself for more foreign participation. (MITI says that by August of 1974 it will open up computer-related manufacturing to increased investment by foreign companies.) This preparation to meet a stepped up American challenge might, in fact, involve actual mergers in addition to the cartel arrangements. In other major industries, government promoted mergers of several weak producers have given competitive strength to the survivors.

The economics

In the olden days, Japan was a cheap labor country. But no longer. Although wages are still below those of the U.S., they are galloping upwards in Japan's own version of a wage-price spiral (note the annual "Spring Offensive," the Japanese version of strikes for higher wages). But business expansion continues, and labor shortages are rampant in the EDP field as well as other areas.

To move ahead in computers, Japan will have to meet or beat U.S. standards of product development and manufacturing efficiency . . . as well as supply software and support. The Japanese manufacturing companies are strong in applied technology; they churn out product improvements, but seldom come up with major breakthroughs. In addition, the Japanese systems software continues to lag, partly because the field hasn't attracted high-quality programming talent.

And as everyone knows, simply building a good machine is only the first step toward an effective computer industry. Japan's major challenge -- especially as it competes for business in other parts of the world -- is to provide users with good applications software and support, and effectively promote its computers.

Prognosis

An American computer executive looking at the Japanese computer industry is faced with something of a dilemma. On the one hand, he's told that the market is growing at an incredible pace . . . and then he hears that he can't have a share. He knows from experience that computer systems is one of the toughest fields for a newcomer to break into . . . but so was autos, and it didn't stop Toyota. He reads that Japan, under pressure from Washington, may liberalize peripheral import restrictions . . . then he discovers -- as this issue points out -- that nominal liberalization may not be enough and even that it will be slow in coming for the central processors so long as a tariff surcharge is on the books.

To clarify some of this confusion, EDP/IR closes this issue with a summary of our "gut feelings" about Japanese activities in computers. First, for the next few years at least, the Japanese will represent no threat in the U.S. computer marketplace. Second, they will represent a threat in international markets, but it's difficult to predict how serious. Third, opportunities do exist for U.S. computer-related companies in Japan . . . but they are limited to specific products not adequately supplied by Japanese companies, or to special status companies such as IBM Japan, or to indirect forms of participation such as licensing agreements.

To Japan, Inc., the computer industry is just one piece in the economic chess game. But it has too much potential to be a sacrificial pawn, traded off in an effort to keep the U.S. market open for other Japanese products. Fast-growing Japanese EDP use will not only keep electronic companies busy expanding their operations; it will also provide the essential customer base for a concentrated Japanese attack on world computer markets. Forewarned is forearmed!

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EDP industry report

• THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" SEPTEMBER 29,1971 • VOL.6,NO.23 P.J.McGOVERN,EDITOR

Then there were six . . .

RCA ABANDONS THE MAINFRAME BUSINESS

Off the record, I'd say there doesn't seem to be much precedent for an action such as this . . .

The whole thing simply doesn't make sense . . .

There was no aggressive attempt to market the division at the corporate level; as a result, everything is evaporating so quickly that nothing will be left within a month . . .

It's an understatement to say that the whole affair was very badly bungled. -- comments from RCA employees

Twelve days ago, RCA quit the general-purpose computer business -- unexpectedly, and rashly. A skeletal decision was made in the boardroom late on Friday, Sept. 17. It quickly diffused out to the press, and was made official after many employees had gone home for the weekend. It spurred a long weekend -- and a short following week: Reality set in and rumors ran askance around and 'round the circuit.

The following week, 2672 layoffs and 800 one-week "furloughs" brought RCA's computer employment down from almost 12,000 to the 8600 level. And at midweek, just as this issue of EDP Industry Report was going to press, a minimal clarification statement was hand-delivered to RCA users (page 4). The announcement seemed to emphasize that no buyer was ready to come forward. Personnel lucky enough to receive job offers were bailing out. Users were holding firm, confident that IBM could take care of their needs if RCA couldn't.

Within the industry, indeed, undue charges of IBM dominance were being made. To EDP/IR, however, RCA's withdrawal didn't spell disaster. It does underline some industry fundamentals that have existed, and that aren't likely to change:

- Participation in the mainframe sector is expensive, particularly for across-the-board penetration. Just one year ago (EDP/IR Aug.31,1970), RCA admitted that vigorous competition would cost close to $1 billion. Now, with $500 million pegged for possible writeoff and another $500 million projected before profitability, RCA management seems to have argued that talk is easy, check-signing a little more difficult.

- When the computer industry is exposed both to economic recession and new product introductions, "Fortress IBM" is particularly invulnerable. RCA

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tried this through me-too-ism and lower prices . . . with the resultant non-lock on customers. For a combination of reasons, this approach didn't make it . . . capturing only 130 orders for a new series that was expected to bring in 1000 or so by this point in time.

- Offering compatibility and more power for fewer dollars hurts (even IBM found this out) when present customers can "sidegrade" and take dollar savings. (Many orders for the RCA 2, at $14,600/mo., came from users of Spectra 70/45s, currently paying $23,100/mo. on average.)

So despite some rather rash statements that showed up in the press last week, IBM didn't force the demise of RCA. In a very real sense, however, the attempt to apply IBM principles was no small factor in what happened . . . or is happening.

The RCA withdrawal story isn't over. In a way, it has only begun. But what has happened to date (see box, page 4) can be put into perspective, and what is currently up for grabs can be evaluated. This article, then, only sets the framework for the eventual finale. Interestingly, it comes at a time when Digital Equipment Corp. has announced plans for increasing its penetration in the general-purpose computer area (page 6) . . . but in a limited way.

How did things get here from there?

Despite the rapier-like suddenness with which RCA top management disemboweled its computer operations, the signposts were there for the reading. Had Chairman Robert W. Sarnoff not declared one year ago that "RCA [was] prepared to commit whatever resources are necessary" to attain an industry rank "second only to IBM in this country," the move might have been predicted.

Indeed, RCA had been in the computer business for over fifteen years and had but one claim to fame: In 1959, it delivered the industry's first solid-state computer, the 501. For the next ten years, RCA was content to mimic IBM's product approach, trying to pick up the scraps. But during the 1960s, RCA failed to imitate the strongest characteristic IBM possesses -- its marketing strategies.

During the fall of 1964, for example, RCA boldly introduced its Spectra family, a mix of computers designed to sell directly against IBM's System/360. RCA promised model-by-model compatibility, with a 10% to 20% performance advantage for 10% to 15% lower cost. This product strategy, however, was not so successful as anticipated. During the following six years, RCA delivered fewer than 1400 of its Spectra/70 computers while IBM shipped over 33,000 System/360s.

There was some "second source" buying by large 360 users, and a corporate account marketing strategy brought in a few "name" accounts during what otherwise was a lackluster marketing performance. This, plus success with governmental EDP users -- especially at the state and local level -- kept the company from dropping its computer operation. An analysis of its customer base shows the emphasis.

RCA, at yearend 1970, had over half its customer base concentrated in only five industrial sectors (table, page 3), and almost 60% of that base was located at a local, state, or Federal Government facility. The single largest Federal contract held by RCA is with the Air Force Logistics Command, which has 45 Model 301 computers. In the communications sector, RCA has the second highest penetration of the major mainframers with installations at several Bell Telephone operating companies. This resulted from work with New Jersey Bell in the early 1960s.

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INDUSTRIES HEAVILY PENETRATED BY RCA COMPUTERS (YEAREND 1970, BY NUMBER)

Industry	% U.S. Market Share	No. RCA Computers
SIC 48 -- Communications (AT&T)	8.8%	88
SIC 91 -- Federal Government	5.7	205
SIC 36 -- Elec. Mach. Mfg. (incl. RCA)	4.3	89
SIC 40-47 Transportation Carriers	4.6	56
SIC 92-93 State & Local Government	5.1	118
ALL INDUSTRY	2.2	1071

Lack of a lock

Late in 1969, RCA began a complete revamping of its Computer Systems management team, pulling off the only high-level raid ever made on IBM management (EDP/IR Aug.31,1970). Expanding its marketing force to almost the second largest in the U.S., RCA -- with Sarnoff's "total commitment" -- took dead aim on IBM's middle-of-the-line 360 base. It went after the U.S. base of 360/30s, 40s, and 50s that represented $9 billion to $10 billion in installed value. This was certainly the largest target around; it was and also remains the most impregnable.

In attacking the strongest bastions of Fortress IBM, RCA essentially ignored the most important asset any mainframer has -- its installed base. It nibbled away at multi-system accounts, stressing "guaranteed conversion" . . . and compatibility. In the process, it lost old, established business and failed to "lock up" new business. This loss of control (a real "no-no" to anyone steeped in the IBM marketing philosophy) shows up in an analysis of U.S. computer installation sites:

BREAKDOWN OF GENERAL-PURPOSE CPUs AT U.S. SITES

	IBM Sites	"Other" Sites	RCA Sites
Single System Sites	74%	68%	42%
Multiple System Sites			
With IBM	19%	14%	31%
With RCA	1	1	17
With "Other"	6	17	10
TOTAL	100%	100%	100%

In the above table, manufacturers other than IBM and RCA are treated as a group. This breakdown shows that IBM computers are alongside others at only 7% of the sites where there is an IBM computer; this figure is 41% for RCA, and three out of four of these mixed sites involve an IBM mainframe. If IBM were to capture all of this mixed-site business, it would increase IBM's base by only 1%; this would, however, absorb one-third of today's RCA customers in the process.

Going, going, gone?

As soon as the RCA Board of Directors had sounded the death knoll for the company's computer business, L.E. Donegan and his team of exIBMers went into a weekend huddle and came up with an emergency proposal for trying to sell RCA's computer

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STATEMENTS BY ROBERT W. SARNOFF, RCA CHAIRMAN AND CHIEF EXECUTIVE

July 12, 1971 - "Neither rumors nor setbacks will undermine our commitment to computers. We've faced them before -- as we did in color television. We believe computers can do for [us] in the Seventies what color did in the Sixties.

September 17, 1971 - "Today I submitted . . . a proposal calling for a fundamental reorientation of RCA's efforts in the computer field. This proposal has been endorsed unanimously by the Board of Directors and will be implemented as rapidly as possible. It involves three key decisions:

1."For RCA to withdraw from the general purpose computer business. This means the discontinuance by RCA of the manufacture and marketing of general purpose central processors . . . and related peripheral equipment.

2."For RCA to concentrate its computer efforts in the development, manufacture and marketing of specialized data communications systems for application in such areas as government and defense, communications networks, and specially designed business systems.

3."For RCA to continue its expanding third-party maintenance program for computers and other types of sophisticated electronic equipment. . .

"These decisions are the outgrowth of intensive studies . . . [showing] that the main frame business . . . will continue to grow but at lower levels than previously projected. The severe pressures generated by a uniquely entrenched competition will correspondingly intensify.

". . . I determined that the price was simply too high for RCA . . . Preliminary estimates indicate there will be an extraordinary one-time charge for 1971 that could reach $250 million after tax . . ."

September 29, 1971 - Regional managers were hand-delivering three-page letters to customers. They acknowledged RCA's intention "to fulfill all conctractual commitments;" recognized that " many of our customers' existing and planned installations will be economically and functionally valuable for years to come;" and admitted that "some customers may wish . . . to terminate their use of RCA computer equipment prior to expiration of present contracts." Major points:

MAINTENANCE SERVICES -- the "nationwide field engineering resources of RCA will be used to provide continuing maintenance support . . ."

DELIVERIES OF ON-ORDER EQUIPMENT -- "RCA will meet all of its contractual commitments" but requests reconfirmation that users "do, in fact, want delivery of the equipment."

ADDITIONAL EQUIPMENT COMPONENTS -- Since some users will require more equipment, RCA promised to explore every user's needs and "respond indicating our ability to meet individual requirements. Beyond this, RCA will continue to provide additional equipment . . . on an as available basis."

SUPPORT SERVICES -- RCA hedged: "With regard to support services, such as programming systems and maintenance, systems engineering support and educational services," RCA will review user requirements, then "certify" its ability to meet user needs.

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business as a "package." And during the last week or so, he has been talking to potential buyers all around the country. (Some reports say that at least one team member went scurrying off to Europe, where RCA has license agreements with ICL and Siemens.) The package being offered has three essential elements:

- Physical plant -- Over 2.5 million square feet of manufacturing and office floor space would seem to be an asset . . . but with U.S. computer shipments level at best for the non-IBM manufacturers, it's not certain that more manufacturing space is what other computer or electronic manufacturing companies want just now. There is talk that DEC might want some of the one-year-old manufacturing space near its headquarters in the Boston periphery.

- Marketing and support personnel -- Of the 9200 employees that remained on RCA's Computer Systems payroll at presstime, an estimated 5,000 to 6,000 were in marketing, systems programming, and support functions. But the best of these were bailing out as rapidly as possible, and the "people" value of the package is going downhill.

- User base -- Almost 40% of RCA's U.S. installed base is composed of computers that have been purchased at an original cost of just over $300 million. The remaining $550 million is on rent, and brings in almost $12 million a month. Almost 75% of this comes from Spectra computers which, although three-to-five years old on average, still have several years of useful lifetime remaining. This usefulness, however, is probably limited to current RCA customers.

So the package is worth different amounts to different buyers. There is talk that a pricetag of about $150 million -- which could be recouped rather rapidly from rentals -- is said to be the going price for the package. And in the rumor sweepstakes, front-runners are Xerox, Univac, Westinghouse, Memorex, for the total package; leasing companies or facilities managers for pieces if it is broken up.

Prognosis

Some commentators have said that if GE (fourth largest industrial in the U.S.) and RCA (21st largest) can't make it in computers, then who can? Perhaps they are looking at the situation backwards. With roughly 3% and 7% of corporate revenues coming from computers (respectively), who's to say that either of these large electronic manufacturers really gave computers a try. The lowest companies on the list today are Xerox, with 6%, or NCR with 15%. Just food for thought.

Flittant observers today echo flippant observers of 1965 with their talk of the computer industry beginning to parallel the auto industry. Then, as now, people talk of IBM, HIS, and one or two others emerging as the forces in the mainframe industry. So far, so good.

We're not about to project the demise of any other company; of those left, each has unique characteristics. But we do forsee further consolidation, and some retrenchment into particular areas of expertise. The computer business is rapidly evolving into the information processing industry, and we believe in its importance. Matter of fact, IBM could be the long-range "loser" in many segments, simply because it legally can't enter some of the markets that will be more and more important as the 1980s approach. Tomorrow's winners may not even be among the companies considered major forces today. Things are changing.

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WITH AN ANNOUNCEMENT MORE FANFARE THAN NEWS, DIGITAL EQUIPMENT DECIDES TO PLAY THE COMPUTER INDUSTRY GAME AND ACCEPT SOME OF THE RULES

> *We have developed our own unique approach . . . We will concentrate all of our marketing and sales effort on what we call the 'discriminating large computer user of the 70s' . . . He is sharp, demanding, and innovative. He is the type of customer we have worked with before and understand well, and the new breed of decision maker we anticipate seeing more of in our future markets.*

With these words, Winston R. Hindle, Jr., group vice president of Digital Equipment Corporation announced his company's intent to focus increased emphasis on the marketing of large, general-purpose computers. A major target will be the commercial EDP market. In so doing, DEC apparently plans to strike off undramatically in a search for large systems users who are the same kinds of people that have always been loyal DEC customers.

Adding strength to this announcement, DEC introduced additional elements for the PDP-10 and rechristened it the DECsystem-10. The full package includes:

- The DECsystem-10 family. DEC announced a new "super PDP-10." But rather than offer two computers with various options as it does in its traditional minicomputer markets, DEC has dressed its larger machines up as five different models of a single family, and changed the name so that no one will be confused. The familiar PDP-10 is now a 1040, a 1050 (if it has a high-speed swapping drum), or a 1055 (a dual-processor 1050). The "super 10" began as the never-announced PDP-10/I with virtual memory, and now has other bells and whistles. It comes as a 1070 or a 1077 (dual-processor 1070).

- New business-oriented peripherals. To increase its share of the commercial market, DEC will now supply the wider range of peripherals required -- card readers, high-capacity on-line storage disks, high-speed magnetic tape units, a remote-batch terminal, and a communications multiplexer. The former three are supplied OEM by independent manufacturers such as ISS and Bucode; the latter, interestingly, are built around a PDP-8 and PDP-11 minicomputer, respectively.

- A lease-purchase plan. Until now, the user either had to purchase his DEC computer outright (which 70% did) or lease it from a third party. The commercial market, on the other hand, is well-conditioned to the IBM-type rental arrangement with its 90-day cancellation clause. DEC has adopted a compromise, offering a five-year lease with option to purchase. Over the short run, the company says, it will not require outside financing to handle its business.

DEC expects to capitalize on the DECsystem-10's good price/performance ratio and its ability to execute batch, remote-batch, time-sharing, and multiprogramming tasks simultaneously. The company is not trying to attract straight batch users; rather, it will seek out sophisticated customers who want to string computers -- DEC minicomputers or IBM/360s -- together in a network.

In a sense, DEC is trying to climb the staircase IBM seems to be descending. While IBM is busy selling System/7s for use in networks hooked to 360s or 370s, Digital will attempt to string together some of the 10,000 PDP-8s installed around

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the world. But DEC's objectives are not really ambitious, by industry standards, and IBM may not even feel the intrusion.

DEC's bid for business

Over the next two years, DEC wants to increase its large-system shipments by about 50% a year, from the $30-million level today to about $66 million. If this is done, it will double DEC's penetration in the $8,000-to-$35,000/month rental range . . . moving it from 0.3% to 0.6% -- nothing to write giant headlines about! Even so, it's important to DEC, and the company seems to have a realistic plan.

Apparently profiting by its competitors' mistakes (RCA, for example?), DEC will not attempt to increase shipments so rapidly as to cause a loss in revenues over the short term. So -- if Digital continues its announced emphasis on these general-purpose systems and increases that portion of its sales force by 50% as stated -- the plans seem sufficiently undramatic as to be feasible.

Digital expects about half of DECsystem-10 installations to be in new markets, the other half in markets where PDP-6s and PDP-10s are currently used. DEC's present base of about 200 general-purpose systems worldwide falls into three categories:

	PDP-6	PDP-10	Total
Education	21	60	81
Research and Development	3	75	78
Data Service Organizations	1	34	35

With its increased capabilities, the DECsystem-10 family will compete effectively in all of these markets, offering easy and painless upgrade potential to customers at the smaller end of the range, improved price/performance at the upper end. DEC claims that the 1070 offers a service bureau two-to-five times the profit potential currently available with competitive equipment. It is the only computer in the medium price range that has an operating system designed specifically for time sharing (rather than a time-sharing module running in a batch environment).

The company anticipates that most of its current PDP-10 customers will upgrade to DECsystem-10s. This conversion, however, may not be quite so simple as it sounds; many PDP-10 customers have made extensive modifications, especially to system software, and may not want to invest in equivalent changes for the new system.

The strategy for new markets

New markets cited for DECsystem-10 sales are "commercial and industrial," with special emphasis on banking/finance and printing/publishing. Interestingly, IBM is less a foe here than in most. The banking industry has always been heavily committed to Burroughs and NCR . . . so much so, in fact, that IBM's lowest penetration outside the Federal Government is in this area. In printing and publishing, DEC already has quite a few minicomputer typesetting systems; it will be meeting IBM and Honeywell as it tries to install larger systems.

Even in these markets, Digital will not compete head-on with the major mainframers. DEC's target is the user who has complex interactive or communications-oriented tasks. In general, it plans to expand its industrial coverage into factories and process environments . . . calling on DECsystem-10's ability to tie satellite minicomputers together into a network. Even while operating on line in these applications, the company claims, the new computers will do administrative jobs.

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The weakest portion of DEC's package is applications software. For the printing market, it is purchasing a set of packages from Copley Press in California. In the banking/finance and other commercial markets, however, programs are sadly lacking and DEC apparently has no concrete plans. It will generalize its own accounting programs, but seems to think the "new breed of decision maker" will be a programmer as well.

The cards DEC will play

As mentioned earlier, DECsystem-10 is really two CPUs -- with add times of 2.8 and 1.5 microseconds, respectively -- that come in five models as follows:

Model	Purchase	$/Month	Maint.	Delivery	Equipment Needed for Upgrade
1040	$ 400K	$ 8,400	$ 1700	3-6 mo.	----------
1050	$ 655K	$13,755	$ 2650	3-6 mo.	High-speed swapping drum
1055	$1010K	$21,210	$ 3850	3-6 mo.	Second 1050 processor
1070	$1175K	$24,675	$ 4150	9 mo.	New processor and memory
1077	$1680K	$35,280	$ 5250	12 mo.	Second 1070 processor

Maintenance must be paid monthly, in any event. All models use the same operating system that simultaneously handles multiprogram-batch, remote-batch, time-sharing, and real-time tasks; the operating system provides upward and downward software compatibility and dynamically allocates resources. DEC claims to have the best ANS Cobol available today, and also supports Fortran IV, Basic, and Algol compilers.

How the chips are stacked

Emphasizing its intentions to move more nearly into the mainstream, DEC introduced what it calls a "high-equity lease plan" for DECsystem-10. Under this plan, the customer agrees to purchase the computer, leases it for five years (see actual numbers for typical configurations, above), then buys it for a small percentage of its market value after five years. The plan allows customers to upgrade their systems by trading in existing equipment and obtaining credit on higher-performance peripherals and central processing units, based on a schedule of equity buildup.

As DEC begins to emphasize commercial and industrial markets, EDP/IR estimates that the portion of DECsystem-10s financed under the lease-purchase plan will grow from the 30% of today's installed base on third-party lease to about 60% of 1973 shipments. This would involve about $60 million worth of computers over the next two years and, given a reasonable growth for the company as a whole, it would appear that outside sources of money will not be required.

DEC may find the going a little rough among the customers in "new" markets who are accustomed to renting. Even though any investment tax credit will be passed on to users, and even though DEC says it will make every effort to help customers sell equipment if they want to cancel, severe short-term cancellation penalties are involved. The majority of users simply don't like to purchase computers.

In a significant way, however, IBM may have done Digital a big favor. With IBM users reacting so favorably to fixed-term leases on peripherals (EDP/IR Aug.31, 1971), and with other mainframers -- especially Honeywell -- already pushing long-term leases -- users might not balk the way they might have even months ago. Thus, as DEC at least acknowledges the "rules" of the general-purpose computer game, the rule-makers have moved in the direction of longer user commitments.

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"THE GRAY SHEET" OCTOBER 19,1971 • VOL.6,NO.24 P.J.McGOVERN,EDITOR

Moves toward compatibility

IBM APPARENTLY DROPS 360/20 AS IT BEEFS UP SYSTEM/3; SOME CARD USE PERPETUATED AS MOST 360s AND 370s GET 96-COLUMN CAPABILITY

As IBM's order books "continue to be adversely affected by a high rate of discontinuances," the company seems to be reaching into its hat for every trick it can think of. From the field, there is talk of special customer deals that imply rebundling. And officially, since the announcement of the fixed-term lease plan (EDP/IR June 2, 1971), IBM has:

- Introduced a tape drive for System/3, thereby admitting that tape is useful on "disk" systems. The drive, or its tape, can be used with a System/360 or System/370 mainframe, and therefore tends to give the S/3 much more compatibility with the rest of IBM's computers.

- Announced a 96-column card read-punch that will operate with most models of System/360 or System/370 (only the 20 plus a few very large processors are excluded). This provides an easy upgrade route for System/3 users and tends to perpetuate the punched card as a primary input media.

- Provided a means for using the 3270 display system with the System/3, Model 10. This further solidifies S/3's expected role in computer hierarchies and re-emphasizes what may well be IBM's answer to key-to-tape or key-to-disk (see page 3).

- In a separate move, put all disk packs on a purchase-only basis by transferring these products to its Information Records Division. This won't make a tremendous difference this year, but it is a way of speeding up a tiny bit of revenue that would have been spread over several years.

Conspicuously, the 360/20 was left out of the models enhanced by various announcements. And no wonder. Almost half the 20 users (EDP/IR May 14, 1971) are moving "up" to System/3. So the wave of the future looks clear: System/3 to System/370. This means, of course, that the smaller series will probably have even more enhancements in the future.

The introduction of 96-column card equipment for 360 and 370, of course, raises again the question of what IBM's reaction to key-to-disk systems might be. Reading between the lines, EDP Industry Report speculates that IBM's 3270 data entry terminal is the answer being provided for multiple-station system applications.

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Stepping-stones to compatibility

Offering many "advanced features of the high-speed IBM 3420 tape drive at lower cost," the new 3410 tape subsystem is packaged in a desk-high cabinet with reels mounted horizontally instead of vertically. A transparent sliding cover similar to that of a rolltop desk "provides easy access." Three different models read and record data at 20,000, 40,000, or 80,000 bytes per second, and two of them can interchangeably handle 800 or 1600 bits an inch at the flick of a switch. One tape unit (called the 3411) contains the control circuitry for four drives on a System/3, or six on a 360 or 370.

IBM has announced that these new tape drives will qualify for the previously announced fixed-term lease plan with reduction in monthly rental of 8% for a 12-month lease or 16% for a 24-month lease. Initial deliveries are scheduled for the fourth quarter of 1972, and rentals range from $240 to $385 for tape units, $545 to $855 for the drive with the control circuits.

With the new 2596 card read-punch, System/360 or System/370 computers will be able to handle the 96-column punched cards originally introduced with System/3. The device -- which rents for $845 and like other card equipment doesn't qualify for the fixed-term lease discount -- will read 500 cards a minute, punch and print at 120 cpm. In the announcement, IBM stressed that this will make it possible to interchange data (in card decks) between a central S/370 and a remote S/3.

In addition to announcing these devices, IBM pointed to compatibility in several other ways. It made a two-month advancement in first customer deliveries of the 5445 disk storage drive (the larger capacity drive for S/3 that uses a 2316 disk pack) and in Cobol and Fortran for the S/3 Mod. 10. The disk and Cobol will be available next April, the Fortran compiler in June. These will bring programming compatibility between S/3 and 360 or 370. Also, IBM slipped in a real sleeper . . . it announced that the 3270 information display system, itself quietly introduced earlier this year, can be attached to the System/3.

CRT for multiple-station input?

IBM's role as a CRT terminal supplier is generally underrated. Of the 40,000 or so general-purpose CRTs used with computers in the U.S. today, IBM has supplied about three-fourths. And the bulk of these are 2260s, first introduced six years ago. Like the 2260, the 3270 is intended primarily for multiple-station system applications, offering impressive data entry capabilities for relatively low cost. But the new terminal provides many operating characteristics, improved by an order of magnitude, at lower cost to the user.

The 3270 is more versatile than the 2260, and can be used as a remote stand-alone terminal (without a separate controller) as well as clustered within a multiple-terminal system. With larger mainframes, it can be connected directly to the I/O channel of through a 2701 or 2703 control unit on a 360, the integrated communications adapter on a 370. With the System/3, the 3270 is attached through an optional binary synchronous communications adapter, and can process data from remote stations. And the Model 10's newly announced ability to have a second such adapter allows it to relay summary or inquiry data from a 3270 to another CPU.

The new terminal line has many improvements over the 2260. Most significant of these are data editing capabilities that approach those available with key-to-tape or key-to-disk systems. One of the specifications that clearly indicates IBM's

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added emphasis on direct on-line data entry is the rate at which data can be transferred locally into the computer. The 3270 permits data transfer at up to 650,000 characters per second, almost the I/O channel speed of many large computers. By comparison, the 2260 transfers information on-line at a maximum speed of only 2560 cps. Another important performance enhancement is the increased printer speed.

Competitors are waiting

Although all of IBM's enhancements in the 3270 are significant improvements, they are hardly innovations to the CRT terminal field. Many other terminals have as good or better characteristics. Among the competitors to the 3270 are Univac's Uniscope 100, the Infoton Vista Plus, and the Delta Data Telterm 2. All of these are priced competitively with the 3270 . . . and are available today. Deliveries of the 3270 don't start until next May. But then, IBM will likely run rampant.

Some CRT terminals really don't compete for this market: Either they are unbuffered, and can't edit, or they can't be clustered. Others are small processors and fit the category of "intelligent terminals" (EDP/IR June 30, 1971).

What about shared processors?

At a time when shared processors -- key-to-disk systems -- are generating excitement in the computer press, people ask the question: "What about IBM?" The answer is really quite simple when considered in light of the following table:

U.S. DATA PREPARATION CAPACITY
(No. of Keyboards in use, by year)

Year	EDP Keypunches*	Key-to-Tape Stations	Key-to-Disk Stations	Totals
1967	197,600	6,400	-	204,000
1968	211,500	16,000	-	227,500
1969	224,550	30,000	450	255,000
1970	235,000	42,500	3,500	281,000
1971	250,000	52,500	9,500	312,000
1972	255,000	60,500	17,500	333,000
1973	255,500	63,000	26,500	345,000
1974	244,500	63,000	33,500	341,000
1975	221,500	60,000	37,500	319,000

*Includes buffered units, and those for 96-column cards; not verifiers

Even though Univac has made some inroads into the keypunch base with its buffered unit, IBM has a heavy commitment here, and a continuing source of income. Thus, it has not gone heavily in to the other areas. But it can be seen that there is expected to be attrition in the keypunch base, and it seems to EDP/IR that this is the area where IBM plans to introduce its 3270 system in large quantities. Indeed, if these projections are correct, growth in data preparation units will have to come from the terminal area. And it will. EDP/IR expects the installed base of general-purpose CRT terminals to grow from the 40,000 level of today to over 200,000 by 1975. This will come primarily from the large user who today is looking to Honeywell, Consolidated Machinery Corp., or newcomer General Computer Systems for a new and economical approach to data input.

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AT&T ANNOUNCES NEW DATA TRANSMISSION TECHNIQUE AS MCI MOVES AHEAD

At what might have been a routine meeting of the New York Society of Security Analysts last week, AT&T Board Chairman H.I. Romnes mentioned a "technological development" that "will enable the Bell System to meet the demand for digital data service through 1977 largely by the use of existing facilities." Later in the week, the FCC approved the second link in MCI's specialized common carrier network, and data communications was back in the news. (See EDP/IR July 30, 1971.)

At the same meeting, Romnes announced Bell's latest estimates about the projected size of the data communications market. Pegged at $500 million dollars in 1970, the market is now expected to grow ten-fold by 1980, to $5 billion. These figures -- considerably higher than any ever released by AT&T -- are more in line with estimates made by International Data Corporation, publisher of EDP/IR.

USER EXPENDITURES FOR DATA COMMUNICATIONS, U.S. ONLY

Year	Interconnection Equipment	Carriage of Data	Total
1968	$ 75 million	$ 135 million	$ 210 million
1969	110	200	310
1970	150	280	430
1971	215	405	620
1972	$300 million	$ 600 million	$ 900 million
1973	425	875	1,300
1974	600	1250	1,850
1975	850	1750	2,600

The new Bell technique is called "data under voice," or DUV, and is a way for data signals to "hitch-hike" on existing microwave radio systems over lower frequencies. With this technique -- not yet fully described by Bell Labs -- AT&T will only have to add interconnection equipment -- not additional transmission facilities -- to provide a "rapid expansion" of digital data service across the U.S.

Datran, the UCC subsidiary that is seeking to set up a switched digital network among major U.S. cities, said it didn't know enough about the development to comment, but is "pleased that AT&T's revised estimate of the growth of the data transmission market confirms our own optimistic projections." MCI is also awaiting further clarification of DUV, but moving ahead with its system:

- The Chicago-St. Louis microwave link, approved over two years ago, is now being tested by customers as it awaits final local loop setups by the Telephone Company.

- Interdata Communications, Inc., an MCI affiliate, received permission to construct a New York City-to-Washington, D.C. link, and has already put out bids for the equipment. If all goes well, this link will be up and running within a year.

For all the suppliers concerned, 1974 seems to be the year for data communications. That's when AT&T expects to have DUV providing data service for much of the country. That's the year when Datran hopes to be operating its switched data network. That's the year when, according to EDP/IR projections (page 3) direct data input will be playing a significant role in information processing.

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DEDICATED APPLICATION DIGITAL COMPUTER CENSUS

The following data about Dedicated Application (Group B) computers is based on the best information available to the International Data Corporation, and much of it has been verified by the manufacturers. Comments or corrections should be directed to the attention of EDP/IR's census editor, Walter E. Misdom.

Group B computers, as defined by IDC, includes those commonly called mini-computers and certain larger systems usually designed or used for one application, such as process control, data acquisition, or the like. These computers are word oriented (most commonly 8, 12, or 16 bits per word) usually purchased, and predominantly programmed in assembly language or Fortran.

The distribution of the 246 different models (from 65 manufacturers) covered by this census is as follows:

PRICE CLASS	SYSTEM PRICE	NO. MODELS	% TOTAL
1	less than $25,000	90	37%
2	$26,000- $50,000	48	19
3	$51,000-$100,000	31	13
4	more than $101,000	77	31
		246	100%

AS OF JULY 1, 1971

NAME OF MANUFACTURER	COMPUTER MODEL	NOTES	BITS PER WORD	PRICE CLASS	PURCHASE PRICE ($1,000) BASIC	PURCHASE PRICE ($1,000) AVERAGE	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS IN U.S.	NUMBER OF INSTALLATIONS OUTSIDE U.S.	TOTAL NUMBER OF INSTALLATIONS	TOTAL NUMBER UNFILLED ORDERS
Atron/MDS	501	h	8	2	8	35	9/69	85	0	85	NA
Autonetics	Recomp-II		40	4	95	127	11/58	20	5	25	X
	Recomp-III		40	3	65	94	6/61	7	2	9	X
Bailey Meter	750		25	4		110	6/60	32	3	35	X
	755		25	4	80	330	11/61	6	0	6	X
	756		25	4	90	180	2/65	14	6	20	X
	855/25		25	4	100	400	12/68	10	0	10	15
BIT	480		8	1	6	7	12/66	195	3	198	X
	483		8	1	9	12	1/70	90	32	122	X
Bunker Ramo	130		15	4		90	10/61	160	27	187	X
	133		15	4		108	5/64	79	9	88	X
	230		15	4		134	8/63	15	2	17	X
	300			4		275	3/59	18	5	23	X
	330		29	4	22	275	12/60	19	5	24	X
	340		29	4		375	12/63	19	3	22	X
	1018			1		23	6/71	-	-	-	NA
Cascade Data Computer	80/20		8	2	29	35	6/70	8 +	0	8 +	NA
	80/30		8	2	32	40	1/70	25 +	0	25 +	NA
Cincinnati Milacron	CIP/2000	a	8+1	1	2	4	12/69	NA	0	NA	NA
	CIP/2100	a	8+1	1	5	7	7/69	NA	0	NA	NA
	CIP/2110			1	5						
	CIP/4000		18+2								
Clary Datacomp Systems	404		16	2	12	25	11/69	65 +	15 +	80 +	NA
Collins Radio	8311			1	15	17	1/68	NA	NA	NA	NA
	8400			4		950	11/62	25	5	30	X
	8500		32	4	200	1000	1/67	52	15	67	2
Compiler Systems Inc.	CSI-16		16	3	11	50	11/70	NA	0	NA	80
	CSI-24		24	3	15	75	12/70	NA	0	NA	30
Computer Automation Inc.	108		8	1	5	8	1/71	20	0	20	NA
	208		8	1	5	8	8/69]	]	]	]	
	808		8	1	5	8	4/68]	185]	15]	200]	40
	116		16	1	8	11	8/70	35	0	35]	
	216		16	1	8	13	7/69	175	15	190]	155
	816		16	1	10	15	12/68	40	5	45	X
	Alpha-8		8	1	4		11/71	-	-	-	NA
	Alpha-16		16	1	3		11/71	-	-	-	NA
Computer Development	CD-200		8	1	7		8/70	NA	0	NA	NA
Computer Logic Systems	CLS-18		18	1	9	14	3/71	NA	0	NA	NA
Computer Signal Processors	CSP-30		16	4	85	120	6/70	6 +	0	6 +	NA
Comten, Inc.	10			1		17	7/69	21 +	0	21 +	NA
	20		8	3		80	3/71	6	0	6	70
	40		8	4	125	270	8/69	16	0	16	NA
	60		8	4	150	200	6/69	15	0	15	NA
Control Data Corp.	160		12	4	60	112	5/60	49	11	60	X
	160-A		12	4	90	225	7/61	200	65	265	X
	160-G		13	4		535	3/64	35	0	35	X
	924/A		24	4		430	8/61	26	1	27	X
	1700		12+2	4	37	170	4/66	358	97	455	25
	1700-SC		16+2				4/70	57	23	80	NA
	8090		12	3		96	5/64	116	89	205	X
	8092		8	3		67	6/64	60	0	60	X
	G-15		29	3		61	7/55	265	18	283	X
	LGP-21		32	2		42	12/62	140	13	153	X
	LGP-30		32	3	49	59	8/56	290	43	333	X
	RPC-4000		32	4	87	101	10/60	61	12	73	X
	CSC-46		21	4		250	/54	10	0	10	X
	CSC-136		25	4		275	/60	4	1	5	X
	CSC-636		15	4		300	10/63	13	2	15	X
	Elbit-100		12	1	6	7	6/67	5	445	450	NA
	Subtotal							1689	820	2509	25 +

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Datacraft	6024-1		24	4	51	100	5/69	14	0	14	X
	6024-3		24	3	33	75	2/70	40 +	2	42 +	45
	6024-5		24	2	16	35	9/71	-	-	-	NA
Data General Corp.	Nova		16	1	8	11	2/69	770	90	860	60
	Nova-800		16	1	7	10	3/71	25	0	25]	600
	Nova-1200		16	1	5	9	12/70	200	20	220]	
	Supernova		16	1	10	14	5/70	125	15	140]	170
	Supernova-SC		16	1	14	19	6/71	-	-	-]	
	Subtotal							1120	125	1245	830
Datamate Computer Systems	DM-16		16	2	17	26	11/69	12	0	12	X
	DM-70		16	1	9	15	12/70	14 +	0	14 +	NA
	DM-70/ROM		16	1	4	6	10/70	NA	0	NA	NA
	ECP-18		18	1	14	15	11/66	21	0	21	X
Digiac Corp.	3060			1	9		1/70	37	0	37	NA
	3080		25	1	20	25	12/64	16	0	16	X
	3080-C		25	2	26	30	10/67	7	0	7	X
Digital Computer Controls	D-112		12	1	4	10	8/70	85 +	12 +	97 +	255
	D-116		16	1	3	10					
	D-216		16	1	8		8/71	-	-	-	NA
Digital Equipment Corp.	PDP-1		18	4	120	136	11/60	48	2	50	X
	PDP-4		18	3	-	74	8/62	31	5	36	X
	PDP-5		12	2	30	36	9/63	73	10	83	X
	PDP-7		18	3		66	11/64	76	24	100	X
	PDP-8		12	1	18	24	5/65	1147	255	1402	X
	PDP-8/E		12	1	5	10	4/71	825	175	1000	500
	PDP-8/I		12	1	13	25	3/68	2267	860	3127	X
	PDP-8/L		12	1	8	20	10/68	3089	610	3699	X
	PDP-8/S		12	1	10	18	9/66	763	155	918	X
	PDP-8/Linc		12	2	38	48	9/66	94	40	134	X
	PDP-9		18	3	35	70	12/66	305	131	436	X
	PDP-9/L		18	2	20	33	11/68	34	14	48	X
	PDP-11		16	1	11	15	4/70	925	275	1200	400
	PDP-12		12	2	15	35	4/69	427	115	542	75
	PDP-15		18	3	16	55	2/70	348	110	458	80
	Subtotal							10,452	2781	13,233	1055
Electronic Processors	EPI-118		18	1	6		11/70	NA	0	NA	NA
Digital Scientific Corp.	Meta-4		16+2	4	15	60	4/70	27 +	0	27 +	NA
Electronic Associates Inc.	640		16	2	27	50	6/67	95	45	140	X
	1020		16	1		25	2/64	100	25	125	X
	8400		32	4		400	6/65	19	6	25	X
EMR Computer	210		21	4	94	132	4/62	9	0	9	X
	420		42	4	324	450	6/63	3	0	3	X
	2100		21	4	65	143	12/63	8	0	8	X
	6020		24	4	72	176	4/65	15	2	17	X
	6040		24	4	98	224	7/65	10	1	11	X
	6050		24	4	123	360	2/66	19	6	25	X
	6070		24	4	240	600	10/65	1	2	3	X
	6120		16	1	8	16	7/70	NA	NA	NA	NA
	6130/6135		16+2	4	85	200	10/67	61	12	73	NA
Foto Mem, Inc.	Centauer-100		16	1	6	9	4/70	18	0	18	X
Four Phase Systems	IV/70		18	1	6		3/71	40	0	40	50
Foxboro	Fox-1		24	4	150		1/72	-	-	-	NA
GRI Computer Corp.	909		16	1	4	9	1/70	95	14	109	45
General Automation Inc.	GA-18/30		16+2	2	18	50	7/69	33	0	33	NA
	SPC-12		8	1	5	17	1/68	750	75	825	NA
	SPC-16		16	1	10	25	5/70	75	0	75	NA
General Electric Co. GE/PAC	30	j	8	1	7	25	5/69	87	8	95	20
	312		20	4		200	3/60	27	6	33	X
	412		20	4		300	7/62	39	8	47	X
	3010		16	3	13	90	5/70	6	0	6	6
	4010		24	4	76	200	10/70	8	0	8	13
	4020		24	4	79	240	2/67	190	58	248	30
	4040		24	4		120	8/64	45	20	65	X
	4050		24	4		280	12/66	23	2	25	X
	4060		24	4		340	6/65	18	2	20	X
	4070		24	4	300	1500		-	-	-	NA
Hewlett Packard Co.	2000-A	b	16	4	89	101	11/68	153	63	216	5
	2000-B	c	16	4	119	134	8/70	7	1	8	4
	2000-C		16	4	187	205	3/71	3	0	3	11
	2005-A	d	16	3	72	85	6/69	25	6	31	1
	2007-A	e	16	1	20	20	9/68	42	11	53	1
	2100-A		16	2	7	35	10/71	-	-	-	NA
	2114-A		16	1	10	16	10/68	409	109	518	X
	2114-B		16	1	9	15	11/69	489	122	611	54
	2115-A		16	2	15	26	11/67	267	65	332	X
	2116-A		16	2	22	32	11/66	88	17	105	X
	2116-B		16	2	24	40	9/68	641	160	801	11
	2116-C		16	2	20	45	11/69	251	14	265	80
	Subtotal							2375	568	2943	167
Honeywell (CCD)	112		12	1	5		11/69	100 +	0	100 +	NA
	116		16	3		65	4/68	172	35	207	X
	316		16	2	8	27	6/69	635	165	800	150
	416		16	2	17	43	4/67	198	130	328	X
	516		16	3	25	55	10/66	615	194	809	X
	19		19	4		140	5/61	3	0	3	X
	24		24	4		200	5/63	82	3	85	X
	124		24	4	65	130	3/66	109	15	124	X
	224		24	4	75	380	3/65	55	8	63	X
	324		24	4		400	7/68	6	0	6	X
	290		18	4		175	11/69	10	2	12	X
	632		32	4	97	240	12/68	10	5	15	NA
	1642		16	4	144		4/71	NA		NA	NA
	1644		16	4	192		4/71	NA		NA	NA
	1646		16	4	252		4/71	NA		NA	NA
	1648/A		16	4	375	440	12/69	18	5	23	X
	H-21		20	3		63	2/66	41	25	66	X
	Subtotal							2054	587	2641	150+
IBM	1710/1720		6	4		225	2/62	78	31	109	X
	1800		16+2	4	47	235	2/66	860	285	1145	X
	System 7		16	2	17	42	9/71	5	0	5	1000
Imlac	PDS-1		16	1	10	11	2/70	NA	0	NA	NA
Information Technology Inc.	4900/5		8	1	3	5	10/70	NA	0	NA	NA
	4900/10		16	1	10	20	10/65	25	0	25	X
	4900/20		16/32	2	30	50	10/69	10 +	0	10 +	NA

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Interdata	1		8	1	4	11	11/70	15 +	3 +	18 +	60
	2		8	1	9	11	7/68	20	0	20	X
	3		16	1	13	20	5/67	240	20	260	X
	4		16	1	9	15	8/68	360	30	390	NA
	5		16	1	11	25	11/70	55	10	65	NA
	15		16	2	22	35	1/69	74	6	80	NA
	70		16	1	7		8/71	-	-	-	60
	80		16	2	16		5/72	-	-	-	NA
	Subtotal							764	69	833	NA
Interplex	System 1		16	2	47	47	9/70	NA	0	NA	NA
Lockheed Electronics Co.	MAC-16		16	1	11	22	3/69	245	20	265	
	MAC-JR		16	1	8	16	11/70	115	10	125	250
Microdata Corp.	400		8	1	3	4	10/70	35 +	0	35 +	NA
	800		8+1	1	3	8	1/69	134	31	165	NA
	810		8	1	6	10	5/69	255	5	260	NA
	812		8	1	11	15	12/69	24 +	0	24 +	NA
	820			1	6	13	10/70	16 +	0	16 +	NA
	1600		16	1	5						
Mini Comp	MD-708		8	1	5	7	8/70	25 +	0	25 +	90
	Administrator-2		16	3	35	52	12/70	NA	0	NA	NA
	Multi-User-E		16	3	67	85	11/70	NA	0	NA	NA
	Multi User-I		16	3	40	58	1/71	NA	0	NA	NA
Modular Computer Systems	Modcomp-I		16	1	5		11/71	-	-	-	NA
	Modcomp-II		16	2	10	27	7/71	-	-	-]	300
	Modcomp-III		16	3	14	65	12/70	NA	0	NA]	
Motorola Comm. Div.	MDP-1000		8	1	8	19	2/69	50 +	0	50 +	NA
Nuclear Data, Inc.	ND-812		12/24	1	7	10	1/71	NA	0	NA	NA
Omnicomp Computer Corp.	Omnus-1		16	1	5	12	4/71	NA	0	NA	NA
Qantel Corp.	Qantel-V		8	2	14	26	4/70	50 +	0	50 +	NA
Raytheon Computer	703		16	1	13	23	10/67	171	31	202	X
	704		16	1	10	18	4/70	55	15	70	NA
	706		16+2	2	19	30	5/69	55	15	70	NA
	PB-250		22	2	33	48	12/60	155	20	175	X
	PB-440		24	4		140	3/64	18	2	20	X
	PB-520		24	4		128	10/65	26	1	27	X
Redcor Corp.	RC-70		16+2	2	15	30	7/68	125	15	140	NA
Rolm Corp.	1601	i	16	2	20	28	3/70	39	4	43	NA
Sanders	Series 800		16				12/71	-	-	-	NA
Scientific Control Corp.	600 Series		24	3	31	80	10/65	230	0	230	X
	4700		16	3	15	50	4/69	23	0	23	NA
	DCT-132		8	2	28	30	5/69	51	19	70	NA
Spear	Microlinc		12	3	46	57	6/66	33	3	36	X
Spiras Systems/ USM	65		16	2	19	40	8/69	25	0	25	NA
Systems Eng. Labs	810		16	2	38	45	9/65	24	0	24	X
	810-A		16	3	18	90	4/67	236	10	246	X
	810-B		16+2	4	30	150	12/68	95	5	100	X
	840		24	3	65	80	11/65	3	0	3	X
	840-A		24	3	60	75	8/66	36	2	38	X
	840-MP		24+2	4	49	250	12/67	33	0	33	X
	72		16	2	19	40	9/70	NA		NA	NA
	82		16	2	11	33	3/71	NA		NA	NA
	86		32	4	200	325	6/70	NA		NA	NA
	88		32	4	350	600	3/71	NA		NA	NA
	Multidata-A		16	2	15	40	8/70	NA		NA	15 +
Tempo Computers/GTE	1		16	1	14	22	12/69	NA		NA	NA
Texas Instruments	960		16+2	2	14	30	6/70	18 +	0	18 +	NA
	980	k	16+1	2	17	40	5/68	100 +	0	100 +	NA
Unicom, Inc.	CP-8A		8	1	3		2/70	32 +	2	34 +	40 +
	CP-8B		8	1	3		3/70	20 +	0	20 +	32 +
	CP-8C		8	1	5		3/70	30 +	4	34 +	61 +
	CP-8D		8	1	7		4/70	9 +	0	9 +	3 +
Unicomp, Inc.	Comp-16		16	2	11	27	6/70	14 +	0	14 +	7
	Comp-18		18	2	12	38	8/70	20 +	0	20 +	12
Varian	520/i		8+1	1	6	13	9/68	240	120	360	420
	610		12	1		15	7/64	10	0	10	X
	620		16	2		37	11/65	75	0	75	X
	620/i		16+2	1	10	20	9/67	1455	80	1535	NA
	620/f		16	1	11	25	11/70	80	10	90	175 +
	620/1		16	1	5		6/71	-	-	-	NA
	R 620/i		16+2	2	14	28	7/68	28	2	30	X
	R 622/i		16+2	2	15	30	7/68	36	4	40	65 +
	Subtotal							1924	216	2140	660 +
Varisystems Corp.	PAC-16	f	16	1	4		9/69	20 +	0	20 +	NA
Wang Labs, Inc.	3300		8	2	14	40	8/71	-	-	-	45 +
Weismantel Assoc.	WAICO M-16		16	3	90	120	11/70	NA	0	NA	NA
Westinghouse Elec. Corp.	P-50		14	1	16	23	8/64	203	19	222	X
	P-250	g	16	3	40	62	9/67	58	10	68	X
	P-510		18	4	85	110	6/63	21	2	23	X
	P-550		18	4	85	110	6/63	9	4	13	X
	P-580		18	4	85	110	6/63	9	0	9	X
	P-2000		16	2	10	27	8/69	100	22	122	50
	2500		16	2	10	45	6/71	-	-	-	NA
	Subtotal							400	57	457	NA
Xerox Data Systems	92		12	3		90	4/65	42	8	50	X
	910		24	4		120	8/62	168	15	183	X
	920		24	4		150	9/62	111	19	130	X
	925		24	4		200	12/64	13	2	15	X
	930		24	4	80	400	6/64	112	18	130	X
	CE-16		16	1	8	13	5/69	15	0	15	NA
	CE-16/A		16	1	15	25	12/69	38	0	38	NA
	CF-16/A	l	16	1	8	17	11/70	NA	0	NA	25 +
	Sigma-2		16	4	24	125	12/66	210	40	250	X
	Sigma-3		16+1	4	24	140	1/70	113	32	145	NA
	Subtotal							822	134	956	NA
	TOTALS							28,753	6,365	35,118	5,543 ++

Notes:
a. Manufactured under cross-licensing from Micro Data - 800
b. utilizes 2116-B
c. utilizes 2114-B or 2116-B
d. utilizes 2116-B (R.T.E.S.)
e. utilizes 2115-A or B (Educ. Basic System)
f. manufactured by Photon, Inc.
g. utilizes XDS - Sigma 2
h. used in Mohawk 2400 System
i. cross license version of Data General - Nova
j. manufactured under cross-license, Interdata - 1
k. inc. est. 90 units used in-house for real-time, process control
l. version of CAI-116

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NEW REGISTRATIONS BY COMPUTER COMPANIES

[Listed below are brief descriptions of proposed security offerings, from firms in the data processing field, that are currently in registration with the Securities and Exchange Commission. The preliminary prospectus for any issue may be obtained from the underwriter.]

ALPEX COMPUTER CORP.

Alpex Computer Corporation, 37 Executive Drive, Danbury, Ct. 06810, which markets a computing system for retailers through its 50% owned joint venture with Pitney Bowes, Inc., on Aug. 27 filed $8 million of convert. subordinated debentures. Of the proceeds, up to $2 million will be used to repay loans to Pitney Bowes and the balance will be used for working capital for the venture. The underwriters are headed by S.D. Fuller & Co., Inc., New York 10004.

AUTOMATED SERVICE CORP.

Automated Service Corporation, 1106 Ainsley Bldg., 14 N.E. First Ave., Miami, Fla., which provides EDP services to the religious community, on Aug. 27 filed 200,000 common. The proceeds, at $3 per share, will be used for marketing and development of the company's programs and services and for other corporate purposes. The underwriter is Omnibus Corp., 3445 Lenox Rd., N.E., Atlanta.

COMPUTER NETWORK CORP.

Computer Network Corp., 5185 MacArthur Blvd., N.W., Washington, D.C. 20016, a time-sharing company, on Sept. 22 filed 225,000 common. The proceeds ($10 per share maximum) will be used to pay back bank loans and for other corporate purposes. The underwriters are headed by Ferris & Co., Inc., 1720 Eye St., N.W., Washington D.C.

COMTEN, INC.

Comten, Inc., 1950 West County Road B-2, St. Paul, Minn. 55113, a Comress affiliate which markets computers for the communications field, on Aug. 26 filed 487,000 common. Of these shares, 320,000 are being offered to common stockholders and the remainder to holders of notes, upon conversion of $1,336,000 of outstanding notes. Proceeds will be used to repay loans from Comress, to repay other loans, and for other corporate purposes.

LOGIC CORP.

Logic Corp., 21 Olney Ave., Cherry Hill Industrial Park, Cherry Hill, N.J. 08034, which markets the key-to-disk system "Keydisk", on Aug. 26 filed 477,301 common, of which 424,000 are being offered by the company and 53,301 by current holders. The proceeds, at $14 per share maximum, will be used to establish 20 new sales and service offices and for other corporate purposes. The underwriters are headed by Legg, Mason & Co., Inc., 22 Light St. Baltimore, Md. and Butcher & Sherrerd, 1500 Walnut St., Philadelphia.

SYS COMPUTER CORP.

SYS Computer Corp., 17-25 Di Carolis Court, Hackensack, N.J. 07601, which manufactures low-cost digital processors for OEM buyers, on Sept. 10 filed 305,939 common. The proceeds will be used for expansion of the marketing staff and other corporate purposes. Underwriters are headed by Butcher & Sherrerd, Philadelphia.

THE TELEX CORP.

The Telex Corp., 6422 East 41st St., Tulsa, Okla. 74135, a peripheral equipment manufacturer, on Sept. 15 filed $25 million of subordinated debentures with warrants to purchase shares of common stock. Underwriters are headed by New York Securities Co., Inc.

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